THE BOOK of KNOWLEDGE

ONE OF THE MOST BEAUTIFUL CHILDREN PICTURES EVER PAINTED, BY RUBENS

The Book *of* Knowledge

The Children's Encyclopædia

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This is a short guide only to the principal contents of this volume. It is not possible to give the titles of all the Poems and Rhymes, Legends, Problems, color pages, questions in the Wonder Book, and many other things that come into the volume; but in all cases the pages where these parts of our book begin are given. The full list of these things comes into the big index to the whole work.

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FRANCE IN THE REVOLUTION

CONTINUED FROM 2076

WHEN we visit Paris now one of the first sights we wish to see is really not in Paris at all, but eleven miles south-west from the city. For although Paris is full of splendid buildings, palaces, museums, and churches, there is nothing quite so fine in the beautiful city itself as the magnificent and historic Palace of Versailles.

Let us now imagine ourselves there after the short journey of eleven miles by tram or train from Paris, and make our way first to a room called the Salle de l'Œil de Bœuf, or the Ox-eye Room, from its oval window, the shape of the eye of an ox.

Here, under the rich gildings and fine paintings, the courtiers in silks and laces were kept hanging round in idleness and vanity to see King Louis XV. rise and put on his finery. Close by is the room in which the bad old king lay down to rise no more. The courtiers were near by when he died; and then suddenly there came a sound of scuffling and hurry through the great rooms and across the courtyard as they all rushed to the distant apartment of the king's grandson, now Louis XVI., and his wife, Queen Marie Antoinette. A bystander tells us that the young couple fell on their knees together, and, with streaming tears, exclaimed: "Oh God, guide us, protect us! We are too young to reign!" They were not wise enough to reign in those troublous times. France of that day was like a sturdy youth, who has outgrown his only suit of clothes, and no amount of whipping will keep him in it, no patching will make it cover him.

Many irritating customs had come down from feudal times, and of these the people wanted to be rid. The country was heavily taxed to pay for the expenses of the court, and for wars that were over—wars in which France had lost. But the nobles and the church, who owned a large part of the land, did not pay the largest taxes. Thus a heavy burden fell upon the body of the people, while they had not the right to see that the money was not wasted. Instead of living on their estates, the great nobles spent their lives in Paris. That they might have money to spend on the pleasures of the court, they wrung every last penny that they could out of the unfortunate peasants, and there was much poverty and bitter wrong. Beyond all this, however, the king was an absolute monarch. But the people were no longer willing that his word should be law. They felt

they had the right to govern themselves, and to say how the taxes should be spent. France had outgrown its old government. It would have taken a great heart and a wise and steady head to give her a new one without trouble, and Louis XVI. had neither.

At the beginning of his reign he had wise Ministers, who tried to put the money affairs of the kingdom into order, and to arrange that the burden of the taxes should fall on those most able to pay them. But the queen did not like economy, and the nobles hated interference with their old "rights"—which were the people's "wrongs"; and timid Louis gave up his good intentions. All the time the rumblings of the coming storm, so long threatening, grew ever louder.

How the kings and nobles feasted while the people suffered

There is a story of Nero, one of the worst of the Roman emperors, fiddling while his splendid city of Rome was burning. Turn to Versailles, and you will see Louis spending his days in hunting, or making locks. Some of these, and his tools, are still to be seen in the Palace Museum. And the queen? You will find her in the park, perhaps, dressed up as a shepherdess, driving a flock of white sheep with ribbons round their necks, or playing at being a dairymaid in a little thatched farm. And all the time, as they trifled, as the nobles danced and feasted, their beautiful land of France was perishing from neglect.

We have seen, on page 540, how the French lost Canada, and how their vision of an immense continental empire across the ocean faded away as English colonies strengthened. When the American colonies would no longer bear the yoke of the Mother Country, France sent generous help to them in the struggle. When it was over, the French soldiers went home full of zeal for the truths contained in the Declaration of American Independence, feeling perhaps most deeply of all the words, "All men are born equal."

The National Assembly

And so, to the influence of the words of the great writers and thinkers of the day was added that of the returned volunteers, who had seen with their own eyes what it meant to be free and equal and brotherly in a country where there were no nobles, no Royalties.

Then France had to find money to pay for their share of the war which had won independence for the United States. No more could be borrowed or squeezed from the unhappy taxpayers, and at last Louis was obliged to call together the States-General, as they called the Parliament of France. As this was the first time for nearly two hundred years, six generations of Frenchmen had lived and died dumb concerning the government of their country. Great was the excitement during the election of the men who were to form the States-General. There were the representatives of the nobles and clergy, called the First and Second Estates; and the men who represented the great mass of the people—the men who worked either with hands or heads—who were the Third Estate. Lists of grievances were drawn up, also of needed reforms, and even the hopeless roused from their dulness of despair, for something was going to be done at last.

The bursting of the storm

One of the first things that happened was this. The Third Estate determined that its voice should be heard. Hitherto the custom had been for the representatives of the people to sit and talk and vote by themselves, and no one took any notice of their wishes. Now they demanded that they should sit and debate with the other Estates, and have an equal power in voting with them; and they had their way. The three Estates formed the National Assembly, and the chief wish of the people just then was that the king should govern according to certain laws, not by his own will alone; also that all should have a voice in the government.

Louis and his queen and Court were terrified at the power thus seized by the Assembly, for the vain boast of Louis XIV., "I am the State," was now turned by the voice of the people into the declaration, "We are the State," and the timid and foolish king sent away the adviser whom the people most liked and trusted, and summoned German and Swiss troops to Paris and Versailles to keep the people in order.

And now at last the storm burst; it was the beginning of the Revolution. When the crowds in Paris heard the news,

THE SINGING OF THE REVOLUTION SONG

Nothing roused more enthusiasm for the French Revolution than a song written in one night by an officer named Rouget de Lisle, who is here singing the song. It was sung by the men of Marseilles as they marched to Paris, and the people called it "The Marseillaise." It has since been the National Anthem of France.

When the starving crowds of Paris could no longer be restrained, they marched through the rain to Versailles, singing and shouting as they went and compelling all whom they met to join them. The artist has shown in this picture a lady of the nobility seized by the crowd and compelled to sing Revolution songs. The crowd broke into the Palace of Versailles and brought back all the Royal Family to Paris.

and rumors spread that the commander of the Bastille had orders to fire on the people, they became quite wild with excitement, and rushed through the streets, robbing the bakers' shops, the wine shops, the gun shops; shouting "To arms!" and "Down with the Bastille!" Thousands of people attacked the hated prison, till the governor was forced to give in; he was killed in the streets, and the mob never rested till they had pulled down the thick walls that reminded them of the tyranny of kings.

The people now felt their power, and peasants in the country began to attack the castles and monasteries, so as to burn the deeds and papers by virtue of which their lords had so long oppressed them. It is not surprizing that cruel deeds were done in revenge.

The National Guard that had been formed by the citizens to keep order in Paris was commanded by Lafayette, who had fought beside Washington in America, and they chose a cockade of red, white, and blue. The time came when many in danger of their lives were saved by putting on this tricolor badge and shouting: "Vive la Nation!" "Vive la République!" as we should shout "Long Live the Nation!" "Long Live the Republic!"

How the women of Paris fetched bread from the king's palace

The National Assembly at Versailles was talking over plans for reforms, but at last the restless mob in Paris could be no longer held back, and early one October morning thousands of hungry women collected in the market place, crying out for bread. When it was proposed that they should go and demand it of the king at Versailles, they set off to walk in the pouring rain, followed by a great rabble, for eleven weary miles.

Lafayette had the greatest difficulty in keeping any sort of order, and in protecting the king and queen and their children, as the wet and yelling mob burst into the magnificent gilded and painted rooms of the three Louis. They insisted on the king going back to Paris with them. What a procession! Fifty cartloads of the king's grain went first, and pressing before, behind, and round the carriage windows of the Royal Family, thousands of the lowest and roughest sang and yelled and beat drums all the way to the Palace of the Tuileries. "We shall have bread enough now," they shouted, "for we have with us the baker and the baker's wife and boy."

That was the end of the glory of Versailles as a Royal palace; for many years it has been the great national museum of "all the glories of France."

How the king betrayed the people and was found out

The National Assembly worked hard to arrange what they thought would be a better government for France. The old feudal provinces with their oppressive laws and customs were done away with, and eighty-three departments were formed, and divided into districts, which were to be governed by persons elected by the people. The property of the church was taken for the use of the state, and the clergy were to be paid by the government. All titles were abolished, and the king no longer could make laws or fix taxes, or decide peace and war.

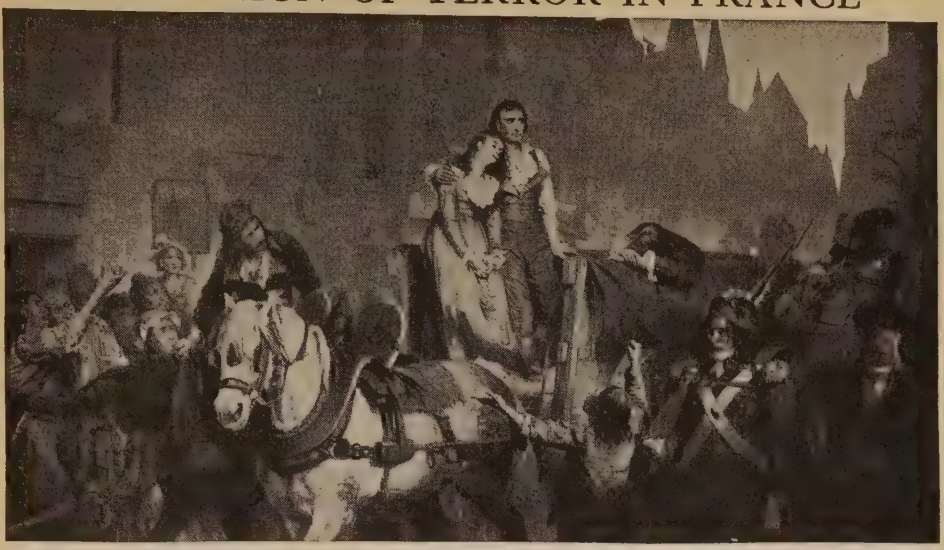
The king agreed to this constitution, but good government could not be arranged all at once; bread was still dear, and people became suspicious of one another, and violence and disorder spread everywhere. Then the king and queen decided to try to escape from France and seek aid from foreign countries, so that Louis could put down all the new arrangements for reform, and make himself absolute king once more.

What beatings of heart must the Royal party have felt in their large new yellow traveling coach when driving away from the Tuileries that summer night through the muddy country, all in the dark! It seemed for some time that all was well, but Louis was recognized, and the carriage had to turn back to Paris. Paris received them in silence, but the excitement was intense, and the news spread over the country that the king had betrayed them, and could no longer be trusted.

The red cap procession to Paris singing the Marseillaise

When the Garde Nationale was formed in Paris, other towns throughout the kingdom formed similar companies of soldiers, and it was about this time that the Garde of Marseilles, right away in the south, on the shores of the Mediterranean, were called to Paris to prevent the king and the nobles having their own

THE REIGN OF TERROR IN FRANCE



During the last fourteen months of the Revolution, scenes like this were witnessed daily in the streets of Paris and other cities. Thousands of innocent victims were taken in rough carts to the place of execution, there to be beheaded by the guillotine, and as they passed along the crowds jeered and insulted them.

At last the people became tired of so much bloodshed, and some of the more cruel leaders who had ordered these wholesale executions were themselves put to death, and more moderate men took control of affairs. This picture shows some of the victims of the Terror; the gaoler is reading the list of prisoners doomed to die.

way and undoing the great work of the Revolution.

Try to imagine the heroic march of these men, in the hot summer weather, their arms and uniforms shabby and dusty, with a banner in front bearing the words: "The Rights of Man." Some wore the red cap of liberty, with tricolor rosettes, some cockaded hats with waving feathers. Branches of trees, stuck in the gun barrels, sheltered the men from the sun. The drums marked step, and they sang as they marched the most inspiriting of all songs—"The Marseillaise"—now the national hymn of France, the words of which, to be found on another page, have often been sung since by armies and vast crowds of people whose blood has been set tingling in their veins. As the men of Marseilles rolled out the words: "Allons, enfants de la Patrie"—"Come, children of our country"—the crowds they passed shouted back in excitement the chorus, as they picked it up: "Aux armes, citoyens!"—"To arms, citizens!"

THE WAY THE PROCESSION CAME TO PARIS, AND THE END OF LOUIS CAPET

Many joined them as they passed on through France, by Avignon, where the Popes once lived for seventy years; by Lyons, now so famous for silk; over hills and dales, across wide plains, and so ever towards Paris, past the wide Rhone, reflecting the red moon, past the nightingales singing in the woods, past the towns and the hovels and the castles, and the men at work on the threshing floors, past the blackberries in the hedges and the little wondering children who sang back to the soldiers: "Allons, enfants de la Patrie." These 500 Marseilles men, who knew how to die, left on July 5. By August 10 they were in Paris, heading a furious attack on the Tuileries. The king and Royal Family escaped to the hall where the Assembly were sitting, but the faithful Swiss Guards were almost all killed, as told on page 1820. It is to their memory that the famous lion at Lucerne, in their native country, has been carved out of the face of the rock.

"Is Louis Capet guilty of conspiring against Liberty? If guilty, what punishment?" were the questions now argued for four days in the Assembly. Capet was the family name of Louis XVI., recalling the line of kings—eight centuries long—descended from Hugh Capet; it was chiefly in consequence of their sins that Louis XVI. was found guilty and condemned to death as an enemy of his country. He met his fate with the same calm courage as Charles Stuart had done over a century before in England.

HOW A GIRL OF FIFTEEN CAME TO PARIS AND HOW SHE LEFT IT

Not long after, the Widow Capet, as they called poor Marie Antoinette, of whom we read on page 1187, met the same fate. There is a bitter contrast in the way she came to France, and the way she left it. We see a beautiful, high-spirited girl of fifteen leaving her home in Vienna to be married in a distant country. As she passed in pomp and state through sympathetic crowds, her tears flowed—it was hard to say good-bye for always, at fifteen, and she had many brothers and sisters. Little more than twenty years afterwards we see a white-haired, sorrowful woman, with noble courage and dignity, standing in a common cart, her hands tied behind her, passing through yelling and insulting mobs, eager to see her die.

Nearly all the nations of Europe rose against France on account of these doings of the Revolution, and the Convention that then ruled the country had hard work to manage the war. But they succeeded in driving back the invading armies.

In Paris, violent quarrels arose in the Convention. Some wished one sort of government, some another, and it ended in the strongest party deciding that men must be forced to do as they wished, through fright and terror. The last fourteen months of the Revolution are called the Reign of Terror, and it is believed that at least 17,000 persons lost their lives in this awful time.

WHEN THE CHILDREN OF FRANCE PLAYED WITH TOY GUILLOTINES

There is a handsome square in Paris now called the Place de la Concorde, then called the Place de la Révolution, and here a tall wooden machine, called after its inventor, the Guillotine, stood always ready to cut off the heads of the condemned. No one was spared who was even suspected of not agreeing with the party in power. Children

NAPOLEON'S ARMY CHEERING THE EMPEROR ON THE BATTLEFIELD

Napoleon led his armies through many scenes like this, which shows us the battle of Friedland, against Russia so terrible for both sides that if such slaughter had continued neither France nor Russia would have had any fighting men left. The French artist Meissonier here shows Napoleon's cavalry cheering the Emperor as they charge the enemy.

were given toy guillotines to play with, women wore brooches in the shape of tiny guillotines, and, worse still, women sat knitting and chatting in the square while the carts rumbled up and the heads fell. And not only in Paris, but in the towns of the provinces, guillotines were set up, and thousands of innocent people perished.

At last the terrible madness of killing showed signs of wearing itself out, and the more moderate party succeeded in getting some power. Marat, who had done so much to cause the horrors by the teaching in his newspaper, was killed by a young woman named Charlotte Corday, who thought it would be a noble deed to free her country from such a monster, and many others who had tried to force men to obedience by the terror of the executions perished by the guillotine even as their victims had done.

THE COMING OF THE BRONZE-FACED MAN IN THE MARTIAL CLOAK

The Reign of Terror came to an end when Robespierre and his followers were brought to the fatal steps of the guillotine. Robespierre had been a leader of the violent party all through, and could sway men by his clever speech and his absolute determination. There was, however, from time to time, fighting again in the streets of Paris. Royalists were trying to restore the Monarchy. The Directors, who then had the duty of carrying out the new Constitution, chose a young artillery officer to lead the Republican soldiers against them. Citizen Bonaparte they called him. He had done well in defending Toulon, the naval station on the Mediterranean near Marseilles, and was now in Paris, looking on.

Let us take a good look at the clear-cut, strong face as the young officer gives the command to fire, and his guns roar and thunder round the Church of St. Roch. You can see the marks of the grape-shot on St. Roch to this day. No more resistance by insurrection for the time was possible. "Citoyen" Bonaparte was loudly called to be "General" Bonaparte, and from this time onwards for twenty years this short, bronze-faced man became not only the most living power in France, but in Europe. All European history for these twenty years is troubled and overshadowed by the figure in the full martial cloak and the cocked hat.

NAPOLEON, THE MAN WHOM NOTHING COULD HOLD BACK

Napoleon Bonaparte was the son of a lawyer in Corsica, and had to learn to speak French at school; it is said that he always spoke French with an Italian accent. He had many difficulties to face before he could place his foot on the lowest step of the ladder of fame; but he overcame them because he was a genius, with abilities above ordinary minds, and he had an intense power of making others believe in him and adore him. When he once made up his mind that a thing was possible, no mere difficulties daunted him. He led his starving and ragged soldiers, when he first took up the command, to a series of brilliant victories in the pleasant, fertile fields of Italy, against the Austrians. Then, with his unerring eye, seeing how important Egypt was to the British, on the road to India, he carried his troops there to fight the Mamelukes and establish a footing for France. "Soldiers," runs his well-known speech as he encouraged them under the hot sun, "forty centuries look down on you from these pyramids."

Fortunately for British plans, Nelson was able to destroy the French fleet in the battle of the Nile, and the victorious army had to stay for a time prisoners in Egypt. Napoleon himself returned in a single ship to France, and succeeded in changing the form of government, and in having himself made First Consul. As soon as he had shown he could manage the affairs of the country as well as he could lead an army, he dashed off again to Italy, which the Austrians had won back. This time we see him leading his men over the rocks and ice and snow of the St. Bernard Pass, cheering them on with the music of the band. How surprised the Austrians were when the Army swung down upon the plains! The great victory of Marengo followed, but at the same time the army left in Egypt was defeated by the British.

FRANCE IS AT PEACE AGAIN, AND NAPOLEON IS CROWNED BY THE POPE

In the peace that followed, the First Consul found time to start many good works at home—roads and bridges were

THE MARCH OF A BROKEN-HEARTED ARMY

To punish the Russians for disobeying his orders, Napoleon marched with a large army across Europe and seized their ancient capital, Moscow. But the Russians set fire to the city and fled, and the French troops could not get sufficient shelter or food. Winter, too, was coming on, and Napoleon had therefore to retreat.

The French army was hampered in the retreat from Moscow by thousands of camp followers, including women and children, and it was by the bravery of Marshal Ney, seen in this picture commanding the rear-guard, that any returned to tell the story. Of half a million men who set out only a few thousands came back.

made, trade was encouraged, education was improved; French families who had fled in the Revolution times were allowed to return in peace; services were again held in the churches. Soon the time came when the Chief Consul succeeded in once more changing the form of the government of France, and this time he became Emperor — Napoleon I. — and set up a splendid Court, making princes and princesses of his brothers and sisters, dukes and marshals of his generals. He made the Pope go to Paris to anoint him Emperor at Notre Dame, and crowned himself and his wife, Josephine, with a beautiful golden laurel wreath.

Again Napoleon crossed the Alps, this time to be crowned King of Italy, with the famous iron crown of Lombardy.

Many traces of Napoleon are to be found in Switzerland, chiefly in the magnificent roads he made, or planned, over the mountain passes.

THE COUNTRY THAT NAPOLEON COULD NOT CONQUER

His next plan was to conquer England, but the "silver streak" of the Channel and the Navy saved it; the large army gathered at Boulogne was finally marched off to help in the Austrian campaign. Another of Napoleon's great victories was soon won. After Austerlitz, the English Minister, Pitt, said sadly: "Roll up that map of Europe; there will be no need for it for ten years to come," meaning that Europe was to be a battlefield for ten years more. Napoleon had now plenty of kingdoms to give away, and he made his brothers and his sisters rulers over some of the conquered states.

To ruin Great Britain, which had just won the important victory of Trafalgar, and which he could not conquer, Napoleon ordered all Europe to close their ports to British ships, so that no British goods could find a market. Most of the countries had to obey, and much loss and suffering followed. But Portugal refused to agree, and Great Britain sent an army to help her, under the general who was later the Duke of Wellington. The French were slowly and surely driven out of Portugal, and finally out of Spain across the Pyrenees. Napoleon's plan also led to war with Prussia and Russia, and although he defeated these countries at the battle of Friedland, after a terrible campaign, he was glad to make peace at Tilsit.

Soon after this Napoleon married an Austrian princess, and their little son was called the King of Rome from his cradle, as we read elsewhere. Great was Napoleon's joy over his boy, for now he thought the Empire was sure to last, and his son would reign after him.

HOW NAPOLEON MARCHED TO MOSCOW AND FOUND IT A CITY OF FIRE

By this time France was tired of incessant war, for thousands of the youngest and finest men were drawn away from their homes, often never to return; and money had to be found, for there is nothing more wasteful and useless than spending money on building battleships, and firing guns, and sending men away to be killed in fighting. But Napoleon wanted to punish Russia for breaking his decree about trading with England, and he led an army into the heart of Russia, to Moscow itself. The Russians could not prevent his doing this; but, as we read on page 2063, they burned their holy city, and destroyed or carried off all the food they could, so that the French had to start home again in snow and bitter cold winds. The retreat from Moscow is one of the saddest events in history. All France had been darkened by the shadow of the sword, as her youngest and strongest sons were drawn from their homes to fill up the ranks of the Grand Army, together with such Germans and Poles as could be collected on the way. Some 400,000 or more, with cannons and horses and bands, and wearing fine uniforms, set their faces bravely eastwards.

THE STARVING TRAIL OF MEN IN RAGS, FOR WHICH FRANCE SUFFERS TO THIS DAY

A few months later, back on the same long route, there crept a starving trail of men in rags, in utter misery and dejection, for eight long weeks. And the rest? Burned in the fires of Moscow, left in Russian prisons, dead under the snow, or under the ice of the frozen rivers. For Napoleon, who till now never forgot, never failed to foresee and plan everything with wonderful skill, seemed suddenly to lose his great powers. He had forgotten how soon bitter winter comes on in Russia; he had forgotten the army was thinly clad

and that stores of food must be had for men and horses; he had forgotten to make arrangements in case his plans did not run out as he expected.

Napoleon left his army as soon as it was out of Russia, and hastened to Paris.

The end of Napoleon's empire and his final defeat

He soon had a new army ready for the field, but his downfall was at hand. Russia, Prussia, Sweden and all the German princes, except the King of Saxony, joined in a "League of Liberation" against him. In the early part of the new war he had some success, but even his father-in-law, the Emperor of Austria, joined the league, and Napoleon was badly defeated in the Battle of the Nations, at Leipzig, when for three October days he fought desperately to maintain the supremacy of the French. This did not end the war, but Napoleon was gradually forced back into France. His army in the south was driven out of Spain by the Duke of Wellington; and seeing that the struggle was hopeless the Emperor went back to Paris, and gave up the throne in favor of his little son. But this did not satisfy the other powers. They decided that his son should not reign. The crown of France was given to Louis XVIII, a brother of Louis XVI, and Napoleon was banished to Elba.

Within a year, as we read on page 792, he escaped from Elba, and, raising an army as he went, marched back to Paris. Louis fled, and Napoleon reigned again for a brief period of a hundred days. It was only a flash of his old glory. On June 18, 1815, his best troops were beaten back by the British army under Wellington; and the Prussian army under Blücher completed the work by turning the retreat of the French into a scattered rout. Napoleon again abdicated, and, after he had vainly tried to reach an American vessel, took refuge on a British warship. The allies decided that he should be banished to the desolate island of St. Helena, and there the great soldier wore out the rest of his days in useless repining.

Again a monarchy under the family of her ancient rulers

Napoleon's conquests were all taken from France by the congress which met at Vienna to settle the affairs of Europe, which he had upset, and Louis XVIII was again placed on the throne. Louis would gladly have gone back to the old order of things, and ruled the country in the way that his fathers had done. But the old belief that the country belonged to the king was gone forever. A spirit of freedom, and love of liberty had spread through the nation, and survived Napoleon's absolute rule, and Louis was compelled to grant a charter which recognized the doctrine that all men were free and equal before the law. This was not the only good thing that had come from the troubled times that the people had come through. If Napoleon had not turned his attention to conquest, he would have been a very great statesman, and all that was best in his rule was kept.

Louis died in 1824, and was succeeded by his brother Charles X. But Charles had so strong a desire to rule as a despot that, in 1830, the people rose against him. Charles was deposed, and Louis Philippe, a descendant of Henry IV in another line, was made King.

Just before Charles was deposed, France had a war with Algiers, to punish the Dey, who had been behaving very badly. The Dey was banished, Algiers was placed under the protection of France, and this was the beginning of the French colonial possessions in Africa.

Louis Philippe, who had wandered about a good deal, and was very poor, professed love for the principles of the Revolution so that he might get the crown; but he was quite as anxious as his predecessors to return to despotic rule. In fact, at this time all the kings of Europe, and their counselors, were trying to hold back the progress of democratic government, and in every country but England and France, they succeeded. Louis Philippe was compelled to grant the country a new charter, and promise to govern by it. He admitted that he was king of the French people, instead of King of France, and he acknowledged that he was crowned by the will of the people. In spite of this, however, he betrayed his desire to be an absolute ruler, and this proved to be his undoing.

A president who became an emperor

Ever since the Revolution there had been a party in France which thought that a republican form of government was best. This party grew in strength as the people realized that Louis Philippe was trying to gain more power. There

were a number of small revolts during his reign, and finally, in 1848, he was deposed, a republic was proclaimed, and the legislature proceeded to draw up a constitution.

There was a good deal of distress among the people, and the new government tried to overcome this by establishing, in Paris, national workshops, where every one who was out of employment could find work. Naturally this curious, but interesting experiment failed. Work could not be made for the numbers of workmen who flocked to the capital, and the workshops had to be closed.

Meanwhile another change of government was coming. Louis Napoleon, a nephew of the great Napoleon, had been chosen as one of the members of the republican legislature. He succeeded in winning the confidence of the people, and when an election for president was held by universal manhood suffrage, in 1849, he was elected.

The new President meant from the first to become emperor, and used the presidency as a stepping stone only. There was a good deal of disorder in the country, which it was difficult to quell. This helped him to gain power, and within a few years he was able to overthrow the constitution and persuade the people to make him emperor. He took the title of Napoleon III, because the young son of Napoleon I had nominally reigned for a few days.

Very soon the constitution was in part given back. Napoleon's rule was mild and for a time the people were content under the imperial form of government—the Second Empire it is called. During the years that had passed since the Revolution, and in spite of all its political troubles, France had grown in prosperity. Napoleon fostered trade and commerce and manufactures. Paris was partly rebuilt and made the beautiful city that it is today, and the first of the great expositions was held in that city. Napoleon's reign was a time of splendor. If he had been able to keep out of war, all might have gone well; but this he did not seem to be able to do.

THE TRAGEDY OF A WAR THAT RUINED AN EMPIRE

The Crimean War, in which England joined with France in 1853 to save Turkey from Russia, was mismanaged, but Russia was defeated. Napoleon went to war with Austria in 1859, to help the Italians in their struggle for unity, and though he made peace with Austria too soon to be of great help to the Italians, he got Savoy and Nice for France in return for the assistance he gave. In 1862, he attempted to create an empire in Mexico, but this the United States would not allow, and he was compelled to withdraw his troops. The army, however, had not been beaten since Waterloo, and when the Emperor allowed himself to be drawn into war with Prussia, the nation, as a whole, was sure of victory, and the soldiers, who thirsted for glory, marched gaily off to battle.

The result was disastrous. Bismarck, the great Prussian Chancellor, was anxious for a war with France, because he saw in it a means of uniting Germany, with the King of Prussia as its dominant lord. The Prussian armies, which had been victorious over Austria a few years before, were ready, and as Bismarck was able to throw all the blame for the war on France, the princes of Germany rushed to Prussia's aid. Terrible defeats were inflicted on the French, who were not ready and were badly led. The Emperor was taken prisoner with his whole army at Sedan; Paris had to endure the most dreadful siege in all its history, and the victorious Prussian king was proclaimed German emperor at Versailles.

Napoleon was deposed and took refuge in England, and since that time, France has been a republic. The terms of peace imposed by Prussia were harsh and humiliating. Alsace and part of Lorraine were taken from France, and the country was obliged to pay an immense sum, called an indemnity, to the Prussians, and a number of French towns were held by Prussian and German troops as hostages until this sum was paid. To the surprise of the world this was quickly done. The hostage cities were recovered, and in the years of peace which followed, the country regained more than its old prosperity.

THE STORY OF THE COMMUNE IN PARIS

Before order was restored, however, Paris went through another terrible experience. During the siege the government had been moved to Bordeaux, and as soon as the Prussian troops were withdrawn from the city, it was seized by the mob. The people established a sort of

government, which is generally spoken of as the Commune, and held the city for months. They barricaded the streets, armed bands went about setting fire to some of the public buildings which had escaped the fire of the Germans. Notre Dame escaped, but the Palais Royal, the Tuileries and the City Hall were destroyed. Finally, the soldiers fought their way into the city, the Commune was compelled to surrender, and thousands of the people lost their lives. Since that time Paris has never regained the great power in the country that it had before.

This is the beautiful Town Hall in Havre, which owes its importnce as a war harbor to the two Napoleons. Havre was made the seat of the Belgian government during the Great War when Brussels was threatened.

THE PEOPLE DEFINITELY DECIDE TO HAVE A REPUBLIC

When the republic was declared, a provisional government was established, very much as in our own day a provisional government was established in Russia. This only lasted until a National Assembly was elected by the people. The Assembly chose Louis Adolphe Thiers as its president, and carried on the government until peace was made, the indemnity paid, and the last of the Prussian troops removed from the country.

After that, it seemed possible that the monarchy might be restored. But the heir of Charles X, whom a number of people desired to make king, refused to reign unless the tricolor, as the flag of France, was replaced by the white flag with the golden lilies of his forefathers. This foolish action settled the matter. To the great majority of the people, the "blue, white and red" stood for their adored country, for which their fathers and sons had fallen and died, and they would not have the man who scorned it to rule over them. The National Assembly quickly set to work to draw up and adopt a short constitution which settled the form of republican government, and the story of France of the Revolution was ended. This was in 1875, and with a few amendments, the constitution as it was then passed still stands.

Napoleon died in 1874, but for a number of years the Imperialist party in France hoped that an opportunity might come to restore the Empire, and place his son, the young Prince Imperial, on the throne. These hopes were destroyed when the young prince, while serving as a volunteer officer in the British army, was killed in South Africa, bravely fighting in the war against the Zulus.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 2415.

NAPOLEON AT FONTAINEBLEAU

Napoleon was one of the greatest conquerors and rulers that the world has ever known. By the unaided power of his great personality he rose from a poor Corsican boy to the position of ruler of all France—nay, almost all Europe. Here we see him at the beginning of his downfall, the first time he was forced to abdicate the throne. He is about to embark for Elba and is saying farewell to his soldiers, who idolized him. His parting from his generals at Fontainebleau, when he kissed the eagle on his standard good-by, was one of the most pathetic scenes in a life of great victories and overwhelming defeats. He led them once more, but only to meet another great defeat.

THE WONDER OF TIME & TIDE

CONTINUED FROM 2211

IN the study of Nature we usually find that changes which go on, such as night and day or the seasons, do not go on always in a particular direction, but go and come, go and come—so that, after they have happened twenty or a million times, things are exactly as they were before. These changes which seem to go round in a circle are usually called cyclic changes, and the study of Nature is full of these cycles. Day and night is the one we know best, but that is a very short cycle compared with many. In the study of the solar system, we find many cycles compared with which day and night are not a moment.

For instance, there is a slow kind of wobble of the earth upon its axis—the line running through it from Pole to Pole—which occurs in cycles twenty-six thousand years long. Further, the paths in which the planets travel get more or less tilted to each other instead of all being on the same level as if they were traced on this paper; and these tiltings go and come in huge cycles that last for countless ages.

Then again, as instances of shorter cycles in Nature, there is the movement of water on the earth, from sea to sky, then as rain forming streams and rivers, and back to the sea again; and there is the cycle of the elements, such as the carbon of carbonic acid, traveling from air to plant, plant to animal, and then from the animal back to the air again.

All these cycles and thousands more are vastly interesting in many ways, and we cannot understand them too well. Yet there is one point of view from which they are not so interesting. They are the causes of a great many things that happen on our earth and in the universe; but as, at the end of a cycle, things are what they were at the beginning, *they do not lead anywhere.*

Suppose that amid all these great workings of Nature we could find some little thing that happened and went on happening, but always in the same direction, or, at any rate, not bringing things back just as they were, then, though this might be something that at any moment could scarcely be noticed it would be in one way, a million times more interesting than any of these cyclic or circular changes.

In the one case things are just spinning round and round so to speak, and, however cleverly and wonderfully they spin, it is still only round and round; but in the other case things are going somewhere, and the question is—*where?* They may be doing so very slowly, so slowly that the whole length of the life of

mankind may be nothing compared with it, but yet, as there is no end of time, they must in the long run utterly change the world if they really go steadily on and do not turn back upon themselves. So we are bound to be more interested, after all, in the smallest thing that goes on in one direction than in the biggest thing that comes back to where it started, even though that coming back should take a million years. With this in our minds let us come to study the tides.

How men first thought the earth would last unchanged for ever

In studying the solar system, men found first that the sun was in the centre of it, next that the planets moved in a particular way round the sun, and next that the sun and the planets were balanced by the law of gravitation. Then they studied the way in which the planets were affected by each other through gravitation, and they came to the conclusion that the solar system is what we call a stable thing—that is to say, a thing so made that, as long as nothing disturbed it from outside, it would last as it is now for ever. But in their studies they left out of account one thing, and that is the tides. They made their calculations about the sun and the planets and their moons as if each of these bodies was and always had been a perfectly solid, rigid, unyielding mass of matter. They could prove on paper that these masses of matter at their present distances from each other and with their present movements would undergo slight changes between themselves, but that these would only be cyclic changes, and that therefore the solar system was made as if to last for ever.

Tides on the sun, on the moon, and on the earth

But we all know that it is not true to think of the earth as a single, solid, rigid piece of matter. If no other evidence were to be had there would still be the evidence of the tides, which all can see. Now, these tides are made mainly by the attraction of the moon, but the attraction of the moon acts on all the matter of the earth as well as the surface. So, if the inside of the earth is not rigid, but liquid, as the earth spins, tides must be caused inside it by the moon. If the inside of the moon is still liquid, as it may be, the earth must cause disturbances there too.

Then take the case of the sun. We have already learnt enough about the sun to know that he is as different as can be from a solid, rigid, unyielding mass of matter. If there is any force of gravitation to raise tides on the sun as he twists, he is certainly very well suited for producing the most tremendous tides we can imagine. It is a necessary consequence of the law of gravitation that every planet, and the moon of every planet, must raise tides upon the sun as he spins upon himself once in every twenty-six days or so.

One at least of the planets, Jupiter, is so big, and therefore has so much power of gravitation, that the tides it raises upon the sun must be by no means small. Jupiter itself is probably still a kind of very small sun, and is certainly anything but rigid and solid, for different parts of Jupiter spin round at different rates, just as we have seen in the case of the sun himself. So Jupiter's moons, and the sun, not to mention the earth and other planets, must raise tides upon Jupiter. The same is true of Saturn.

How we know that the tides will change the whole earth

All this is enough to suggest that perhaps the question of the tides is a very much bigger one than we had thought. At any rate, it is quite certain that we must discover what the tides do in the solar system before we can be quite sure that it will endure for ever as it is now. The old calculations did not take the tides at all into account, and perhaps they make a great difference. A great English astronomer, Sir George Darwin, worked at this subject for many years, and he and others have taught us to discover in the tides a source of change which, though it acts very slowly, yet acts in a certain direction and not circularly, so that in the long run (though how long this takes we can scarcely guess) the tides must utterly change the solar system as we know it now, and as they have partly made it, into something very different.

Let us just remind ourselves of the simple facts about the tides we know best. The connection of earth-tides with the moon has been known for thousands of years, though of course gravitation was not then known. We

now understand that as the earth spins under the pull of the moon, the water next the moon is heaped up, forming the high tide, while the solid body of the earth is pulled towards the moon more powerfully than the water on the far side of the earth is pulled towards it.

THE TUG-OF-WAR BETWEEN THE SUN AND THE MOON AGAINST THE EARTH

So the earth is drawn away from the water, and the water left behind forms a high tide on the far side of the earth as well as on the side next the moon. In between the two, on the parts of the earth between these points, we shall find the low tides—as the water cannot be in two places at once. The sun acts in exactly the same way as the moon, only with less power, as the sun is so much farther away. The pull of the sun and the pull of the moon must be in about the same line when the moon is new or when it is full. But at other times the moon and the sun are pulling more or less at right angles to each other. So, when the moon is about new or full, we have high tides that are higher, and low tides that are lower, than at other times. These biggest tides are called spring tides, and the others are called neap tides; the spring tides being due to the sun and moon helping each other, and neap tides due to the sun and moon opposing each other—that is to say, being due to the pull of the moon *minus* the pull of the sun. The moon is much nearer, and therefore stronger, and so wins in this mighty tug-of-war.

The tides take about six hours to rise to their highest and about the same to fall to their lowest point.

HOW THE TIDES ACT LIKE A BRAKE ON THE SPINNING EARTH

Now, it can be proved beyond dispute that these great tidal waves, constantly traveling round the earth as it spins, act like a brake upon a spinning wheel. The power of the tides comes from the power with which the earth spins, and so the tides are constantly drawing upon that power. This means that the earth must be spinning less quickly from day to day. The tides are increasing the length of the day. No doubt the difference between to-day and to-morrow is a very small one, and any guesses we can make as to the rate at which the lengthening of the day goes on are very doubtful, and not worth remembering, but there is no doubt at all that this change is really going on.

We can prove also beyond dispute that another consequence of the tides is that the moon is getting farther away from the earth. As the moon does so, it must take longer to travel round the earth—in other words, *the month and the day are both getting longer.*

We can trace the course of change both backwards and forwards, and in each case our conclusions agree wonderfully with what we can learn in other ways. If the moon is now traveling away from the earth, it must once have been nearer the earth than it is at present, and the month must have been shorter. If the day is being lengthened because the earth's spinning is retarded by the tides, then the day must once have been shorter. If we go back far enough, we find that the day must have been not longer than about four hours. We are not entitled to go back farther still, because we believe that if the earth had spun much quicker than this—that is to say, if the day had been much shorter than this—it would have spun so fast that it must have flown in pieces.

WHY IT IS THAT WE SEE ONLY ONE SIDE OF THE MOON

Now, if we trace back the history of the moon and the month, we find that when the earth spun upon itself in about four hours, making a four-hours day, the moon must have gone round the earth in four hours, making a four-hours month. But this is just as if the earth and the moon had been one body, only with a break between them, for they spun round together. We only need carry our minds a little farther back in order to conclude that before this time the earth and the moon must really have been one body; in other words, that the moon is a broken off portion of the earth. Now, that is exactly what we have reason to believe on other grounds, and so it is very interesting and important that the study of the tides and their influence on the earth to-day should have brought us back to a state of things when the earth and the moon must have been one.

We may here remind ourselves of something we have already learned. It is that the moon spins upon itself in just the same time as it takes to go round the earth, so that, as we know, we

always see the same face of the moon. It would be a most extraordinary thing if it were a mere chance that the time of the moon's traveling round the earth and the time of the moon's spinning on itself are just the same length. But it can be shown that it is not a chance; on the contrary, that it is what we should expect if this theory about the moon and the tides and their history is true.

WHEN ONE DAY MAY BE AS LONG AS TWO MONTHS ARE NOW

It is interesting also for us to know that, when the moon becomes cold all through—so that it is rigid, and so that any tides in its interior must cease, as they have long ceased upon its surface—then perhaps the law which compels the moon to spin upon itself in just the same time as it takes to travel round the earth will cease to apply. Thus, at some remote date, the moon may go on spinning upon itself at the same rate as at present, but take longer than at present to travel round the earth. This will mean that, if the human race still exists upon our planet, the astronomers of that distant day will be able to see the other side of the moon.

But that is quite a small point compared with the great things which the study of the tides leads us to expect as regards the future. The moon must go farther and farther from the earth, and take longer to travel round the earth; and the earth's day must steadily grow longer. But it can be proved that these changes will not go on at the same rate. The day will grow longer more quickly than the month does—indeed, that must be happening now; and in millions of years to come the month and the day must again be of the same length as each other, as they were when the moon was first formed from the earth. Only, whereas their length at first must have been about four hours, their length then will be about fifty-seven of our present twenty-four-hour days.

WHY THE TIDES ON THE EARTH MUST ONE DAY CEASE

The moon will then be at a great distance from the earth, and so will take all that long time to travel round the earth; but the brake action of the tides will have so much slowed the earth's spinning that the earth will also take fifty-seven days to spin round upon itself.

This means that the moon and the earth will spin round together as if a great bar of steel ran between them, only the force holding them is not steel, but the force of gravitation; and if we could try to replace gravitation by a steel bar, we should find the moon too small to hold its end of a steel bar big enough to do the work which gravitation does so easily.

Now, if there were only the earth and the moon to consider, it could be proved that this state of the earth-moon system which we have just described would be a durable one; but we still have to reckon with the sun. The tides raised by the moon upon the earth will one day cease because, as we see, the earth and the moon will go round together as if a bar of steel ran between them. But there will still be the sun-raised tides upon the earth, or disturbances corresponding to tides in the fluid matter inside the earth. We have left these out of account so far, because they are so much less powerful than the tides raised by the moon; but still, there they are, and there they will be when the moon-raised tides have ceased; and then, as now, they must act like a brake on the spinning of the earth.

THE TIME WHEN IT WILL BE LIGHT AND DARK FOR WEEKS TOGETHER

Now, this means something which you and I can scarcely imagine, so strange does it seem. It means that the moon will travel round the earth in less time than the earth takes to spin on itself. The month will actually be shorter than the day. That is so very different from what we find at present that we can scarcely believe it. But if we turn to another planet that has a moon (or rather two moons), and if that planet is smaller than the earth, so that its changes go on more quickly, and so that it may now be in a state which the earth will not reach for ages, then we shall actually find just this extraordinary thing that astronomers foretell for the earth and its moon.

The wonderful planet Mars, our outer planetary neighbor, is much smaller than the earth, is probably much older than the earth, and has two moons, which were discovered less than fifty years ago. The inner of these moons travels round Mars more than three

times while Mars spins round once on itself—that is to say, the day of Mars is more than three times as long as the month, if we measure the month by the inner of the two moons of Mars. Time was, not so long ago, when this extraordinary peculiarity about the movement of this moon of Mars could not be explained; but now we can explain it by supposing that the spinning of Mars has been retarded by tides raised by the sun, just as is happening, and will continue to happen, on the earth.

THE SLOW CHANGE THAT THE TIDES ARE MAKING THROUGH THE CENTURIES

It is perhaps possible for us to trace the future history of the solar system, as the tides will affect it, a little farther than we have done, but it would be little more than guess-work. The great point for us to remember is that in the action of the tides we find something which, though it acts so slowly that we cannot see its results, is yet acting in a definite direction from which there can be no return. The solar system has not always existed, but is a product of change acting throughout great spaces of time; nor can it exist for ever, for changes are still going on in it which, in the course of ages, will make it very different from now.

We may end this part of our story by noticing two other kinds of change in the solar system which, just because they go on steadily in one direction, are of such great importance. The first is that the whole system is steadily cooling; the sun and the planets are all losing their own stores of heat. Each of them catches a little heat and light given out by the others, but by far the greater part of it is scattered into space; and though it goes somewhere, and is not lost to the universe, it is lost to the solar system. We have lately learnt that the sun and the planets are making heat within themselves from something, but that something cannot last for ever. The heat and light the solar system receives from the stars are nothing compared with what it loses, and it must one day grow cold.

Yet another change is always acting in one direction, and that is the change produced by gravitation. Under its influence the sun and the planets are shrinking, and we must suppose that in the long run all the bodies which now travel round the sun and constitute his system, including the earth, must be at last drawn into the sun, and then the solar system will be no more.

THE ETHER THAT WILL ONE DAY MAKE THE SOLAR SYSTEM ONE ROUND BALL

Quite lately astronomers have come to see that there is another question. The planets and their moons, as they move, are moving *through something*. That something is not the air, for the air is the outer part of the planets or moons that have an air, or atmosphere. It is the ether. We are perfectly certain that the ether really exists, and we already are beginning to learn just a little about it. Now, the question is whether the ether must not slow down the movements of bodies passing through it. Must there not be at least a *little* friction and resistance, as when a fish swims through water, or a bird or a bullet flies through the air? Probably the ether does have such an influence. Its influence is certainly, if it exists, very small. But the smallness of a process does not matter if it goes on in one direction, and if there is no limit to time. It is the slowing action—infinitely slow—of the ether that will probably help, some day, to make the solar system into one dead round ball—perhaps the very state in which it began, ages ago, when it met some other body in the sky, and was scattered into a nebula.

THE REALLY WONDERFUL THING IS THAT WE WONDER AT ALL

But when we speak of the past and the future of our system as influenced by the tides, by loss of heat, and by gravitation, we must never forget that the time which these changes take is infinite compared with our own lives. No one has imagination enough really to understand how great are the stretches of time with which astronomy has to deal, any more than we can really understand the size of the spaces and the distances with which astronomy has to deal. The really wonderful thing is that we human beings should have the power, as we spend the brief moments of our life on this tiny earth, to gain, at any rate, some little idea of the grandeur and the majesty and the mystery with which we are surrounded.

THE NEXT PART OF THIS IS ON PAGE 2389.

TOBY AND THE FAIRIES OF THE CHIMES

When the chimes began to ring many wonderful things did Toby see. The spirits of the bells were swarming all around him; goblins and fairies and elfin spirits in endless numbers were pouring out in all directions from the chiming bells, until the whole interior of the tower seemed thronged with them.

THE STORIES OF CHARLES DICKENS

WE have already read the most famous of all the Christmas books written by Charles Dickens, and we are now to read two more which are almost as well known as his "Christmas Carol." Indeed, it is difficult to say whether "The Cricket on the Hearth" or "A Christmas Carol" is the greatest favorite with his readers. Certainly they are both most delightful stories, not only for Christmas, but for all the year round, and "The Chimes," which is described as a "goblin story of some bells that rang an old year out and a new one in," is always popular.

THE CHIMES—A GOBLIN STORY

CONTINUED FROM 2226

WE have all listened at some time or other to the music of the church bells as they ring out their pleasant chimes every quarter of the hour. The chimes we are now to hear about ring also in four quarters, and the story they tell us in ringing the first quarter runs something like this.

There was the quaintest old fellow you could imagine, named Toby Veck, but better known as "Trotty," because he had a funny little way of walking which gave him the appearance of "trotting." He could not go even a little distance without this jumpy style of movement, and as he was employed, whenever he could get a job, in running errands for people in the district of London where the fine old church with the musical chimes stood, perhaps his little trot was useful; it certainly kept him warm in the cold weather.

As poor old Trotty had only the shabbiest of clothes and the leakiest of boots, it was no easy matter for him to keep warm in winter time. He wore knee-breeches and long gaiters, as some old-fashioned folk did many years ago; but all his clothes had been worn by other people long before they came to him. His tall hat, for instance, was so crushed that it had long been ready for the dust-heap, and even his little white apron, which indicated that he was a porter, had long ceased to be anything but a well-washed rag.

OLD TOBY VECK, THE PORTER

Times were very, very hard with Trotty; but he was a cheerful old soul, honest and always willing to do his best, on any errand he was sent, for the sixpence with which he was usually rewarded. But sixpences were few, and anything but "nimble," one winter when the weather was bad, and even Christmas scarcely seemed to promise better times. Trotty was down in spirits, and things would have gone badly with him but for his daughter Margaret, a bright and cheerful young woman, whose needle helped to keep her and her father in food. Margaret had a sweetheart, Richard, an honest young blacksmith, who wished her to marry him on New Year's Day; but even this good news hardly brightened the spirits of Trotty Veck, as everything at that time seemed to be against him.

Margaret had brought Trotty his dinner—a savory dish of tripe, which he relished greatly—and he was eating this on the steps of a gentleman's house, when out came that person, Alderman Cute, with some friends, who made some very unfeeling remarks about the food of the poor, so that Trotty's heart was down in his boots again. The alderman, however, gave him a letter to carry to a pompous old person named Sir

Joseph Bowley, M. P., and paid him only a sixpence for the errand.

As he trotted off gloomily with the letter, the chimes were pealing from the steeple, and they seemed to say to Trotty—at least he thought so—"Put 'em down! Put 'em down! Good old times! Good old times! Put 'em down! Put 'em down!" So ends the first quarter of "The Chimes."

THE LETTER THAT TOBY VECK CARRIED TO SIR JOSEPH BOWLEY

He thought himself a very remarkable person, this Sir Joseph Bowley, and he and his precious wife pretended to take the greatest interest in poor people; but they were really two self-satisfied humbugs, and were quite without pity for anyone but themselves. It turned out that the letter which Trotty had carried from Alderman Cute was to ask Sir Joseph about a certain Will Fern, who had just come to London from the country village where Lady Bowley carried on her pretentious work among the poor.

Will Fern, with his dead brother's orphan child, was really in London searching for a kind woman who had been a good friend of the girl's mother; he was out of work too, and had applied to Alderman Cute for advice and assistance. But as Will had not taken kindly to Lady Bowley's plans for improving the poor of her village, and had refused to spend his evenings at her class, making buttonholes, her ladyship did not hesitate to think him guilty of any crime, so that Sir Joseph dictated a letter to Alderman Cute advising him to have the rascal locked up.

TROTTY MEETS TWO WEARY WANDERERS AND BECOMES THEIR GOOD FAIRY

Poor old Trotty was almost dazed by the insolent way in which this good and kindly couple treated him, and also at the tone of the letter he had heard being directed to the alderman; so that he cut rather a stupid figure when he was asked to be off with himself and the letter. Still muddled in his mind, as he was trotting back, he ran against a man and a child in the dark streets, and got into conversation with them. To Trotty's surprise the man turned out to be none other than Will Fern searching for the house of Alderman Cute. So, as you may suppose, Trotty told him all he knew, and warned him not to go there on any account, but to come home with him to spend the night.

To think that he was to be of such great service to the poor wanderers completely changed Trotty's spirits, and as soon as he got home he was tremendously busy helping Meg to get supper ready, having bought a rasher of bacon and an ounce of tea with his sixpence, but refusing himself to eat anything, though he was starving, on the pretence that it was well known to his friends that he never cared, himself, for rashers nor for tea. "I like to see other people enjoy them," said Trotty, speaking very loud to impress the fact upon his guest; "but to me, as food, they're disagreeable."

Now the chimes were ringing again, and they seemed to say, "Toby Veck, Toby Veck, door open wide. Toby Veck, Toby Veck, door open wide." This was strange, and he determined to trot out and see if the door of the church steeple was really open, for he had seldom seen it open before.

THE BEGINNING OF TROTTY'S STRANGE ADVENTURES UP THE OLD BELFRY

Out he slipped without his cap or apron, and sure enough the door was open. In he went, and up and up in the darkness, climbing the steps and then the ladders, until he was among the bells, when a sense of dread and loneliness came upon him all at once, and he fell in a swoon. So ends the second quarter.

When the chimes began to ring Toby awakened, and many wonderful things did he now begin to see. The spirits of the bells were swarming all around him; goblins and fairies and elfin spirits in endless numbers were pouring out in all directions from the chiming bells, until the whole interior of the tower seemed thronged with them. But when the chimes stopped, the elfish figures, one by one, faded into nothingness, and then when the bells hung still Toby noticed for the first time that each bell was itself a strange and mysterious figure with a long beard, and its muffled hand on its goblin mouth.

He did not know what to do, he could not move away, and lo! the bells began to speak to him. They asked him all sorts of strange questions, and accused him of having done them a wrong for thinking that they had ever uttered a

harsh note against the poor or had ever sung, "Put 'em down! Put 'em down! Good old times! Good old times! Put 'em down! Put 'em down!" Toby was really greatly distressed at this, pleading that he had never meant to offend them; and when the strange figures said, "Show him what he calls himself," he was aghast to see the tower open at his feet, and far below his own body lying dead! A little fairy figure, the Spirit of the Child, now appeared to him, and showed him strange pictures of his own daughter Meg sitting at work in a miserable room with Will Fern's niece.

Then he heard them talk, Meg weeping bitterly the while, about the cruelty of their lives. And then he found himself transported to a great festivity at Bowley Hall, where Sir Joseph and his lady were celebrating the birthday of the latter, and he heard that a very rich banker had just shot himself!

WHAT TOBY VECK SAW AT LADY BOWLEY'S BIRTHDAY FEAST

But it was a very jolly banquet for all that, until Will Fern came in and said he had just come from gaol, a criminal, as the result of those good people's love of "putting down" the poor and unfortunate. Will's appearance caused a great disturbance at Bowley Court, and in the confusion Trotty found himself spirited away to a miserable garret, where Meg was hard at work, and Richard, the honest smith, in rags, came in to her to tell her that Lilian, Will Fern's niece, would take no help from her; but next came Lilian herself to the garret, where she died of a broken heart. So ends the third quarter.

The Spirit of the Child appears again to Trotty and shows him a very cosy couple in their home. They are Tugby, the fat, lazy porter to Sir Joseph Bowley, who has married Mrs. Anne Chickenstalker, the jolly widow who keeps a "general shop" where Toby owes some money.

He hears them speak of Meg, and of Richard having taken to drink, and—well, altogether poor old Trotty has been having a very bad dream, which is only brought to an end by the dear old chimes ringing a joy-peal for the New Year, and his loving daughter Meg saying to him:

"And whatever you do, father, don't eat tripe again without asking some doctor whether it's likely to agree with you; for how you *have* been going on! Good gracious!"

And then in came Richard, shining with happiness, who kissed his wife that was to be, saying, "The first kiss of Meg in the New Year is mine! Mine! I've been waiting outside the house this hour to hear the bells and claim it."

THE GREAT CHANGE THAT CAME OVER TROTTY WHEN HE WAKENED

"You never in all your life saw anything like Trotty after this. I don't care where you have lived or what you have seen; you never in all your life saw anything at all approaching him. He sat down in his chair and beat his knees and cried; he sat down in his chair and beat his knees and laughed; he sat down in his chair and beat his knees and laughed and cried together; he got out of his chair and hugged Meg; he got out of his chair and hugged Richard; he got out of his chair and hugged them both at once; he kept running up to Meg, and squeezing her fresh face between his hands and kissing it, going from her backwards not to lose sight of it, and running up again like a figure in a magic lantern; and whatever he did he was constantly sitting himself down in his chair, and never stopping in it for one single moment; being—that's the truth—beside himself with joy."

WHY THE LAST QUARTER OF THE CHIMES WAS A VERY MERRY ONE

And while the merry chimes were ringing little Lilian was awakened, and in came a number of Richard's chums with a drum and musical instruments to make merry for his approaching wedding on New Year's Day, and in came Mrs. Chickenstalker, who hadn't married grumpy old Tugby at all, and—just think of it—she was the very woman Will Fern was looking for, and her joy at finding little Lilian to adopt as her own child was so great that, for all her heavy weight, she got up and danced with the whole happy company to the awful music of the band.

So that the fourth quarter, at least, was a merry one, and the bells now chimed nothing but joy.

THE CRICKET ON THE HEARTH

A FAIRY TALE OF HOME

AT some time or another we may have heard the chirrup of the cricket. The merry "chirrup, chirrup," which this little insect makes from its snug corner near the kitchen hearth is a familiar sound to country folk, but it is seldom heard in the cities. In the story we are now to read the cricket plays an important part, and his chirps are heard throughout it. Indeed, the story is divided into three chirps, which you will agree is a change from the old-fashioned "chapters." Let us hear what "Chirp the First" has to tell us.

THE SINGING MATCH BETWEEN THE KETTLE AND THE CRICKET

The cricket is engaged in a lively competition with the kettle as to whose song will be the louder. And it is in every sense a pleasant place for such a competition, as the living-room of John Peerybingle's cottage is as cheery as a bright fire and a busy housewife can make it, and we know how cheery that is.

Peerybingle was a good-natured, lumbering sort of a countryman, over six foot tall, and none too gainly, but honest and warm-hearted. He was a carrier, and drove his horse and cart as regular as the clock along the country road, going to villages on the left of his house one day, and to the right the next. His wife, Mary, was just as bright and happy a little country lass as ever gladdened the home of an honest man. She was younger than John by some years, and very much smaller, so short, indeed, that John always spoke of her as "Dot." They had one child, just a baby in arms, and Tilly Slowboy, a clumsy country girl, was its nursemaid.

THE CARRIER HAS A WEDDING-CAKE FOR "GRUFF & TACKLETON"

There was yet another member of the carrier's family, whose name was Boxer, and him we must not forget, for, just as the cricket had reached the highest pitch of his chirruping, and the kettle had boiled over, Boxer, the dog, came barking at the door, a sign that his master was close at hand.

In a minute more, honest John was inside the room, receiving the heartiest of welcomes from his cheery wife and the chirping cricket. He had driven his cart through the most dismal winter weather, and there was not a more contented man in England that night than John Peerybingle when he sat down to his supper, which the busy hands of Dot had been in the act of preparing as Boxer came barking to the door. By the fireside Dot and John fell to talking of the cricket, and Dot said she loved the busy little creature because he had been chirruping at his merriest when, scarcely a year ago, John had brought her to the cottage as his wife.

They were both so fondly speaking of their love for each other that they forgot the basket of things John had brought in from the cart. But when they did remember it, Dot showed her cleverness by guessing that a round parcel it contained was nothing more or less than a wedding-cake, which John had collected at a baker's for delivering to a very ill-natured toymaker in the village, whose name was Tackleton, but who was called by the name of his firm, "Gruff and Tackleton," because of his unpleasant manner.

THE STRANGE OLD GENTLEMAN WHO WAS LEFT IN THE CARRIER'S CART

This discovery made Dot somewhat sad. She had been at school with May Fielding, the young woman whom Tackleton was known to be anxious to marry, and she had never dared to think that May could marry such a man. Yes; the thought of May having Tackleton for her husband made Dot sad; even the cricket was not singing so merrily now!

The carrier had forgotten something more, however, for he suddenly remembered that he had left an old gentleman in his cart! In another minute he was out at the stable yard with a lighted candle in his hand to see what had happened to his passenger. He found him still asleep, and, wakening him, brought him into the cottage.

"The Stranger, who had long white hair, good features, singularly bold and well defined for an old man, and dark, bright, penetrating eyes, looked round with a smile, and saluted the carrier's wife by gravely inclining his head.

"His garb was very quaint and odd—a long, long way behind the time. Its

hue was brown, all over. In his hand he held a great brown club or walking-stick; and, striking this upon the floor, it fell asunder and became a chair, on which he sat down, quite composedly.

"'There!' said the carrier, turning to his wife, 'that's the way I found him, sitting by the roadside! Upright as a milestone. And almost as deaf.'

"'Sitting in the open air, John?'

"'In the open air,' replied the carrier, 'just at dusk. "Carriage paid," he said; and gave me eighteenpence. Then he got in; and there he is.'

"'He's going, John, I think.'

"'Not at all; he was only going to speak.'

"'If you please, I was to be left till called for,' said the stranger mildly. 'Don't mind me.'

"With that, he took a pair of spectacles from one of his large pockets, and a book from another, and leisurely began to read, making no more of Boxer than if he had been a house lamb."

CALEB PLUMMER AND HIS DAUGHTER

Presently there was a knock at the door, and Dot thought it would be somebody calling to take away the old gentleman. But, no; it was only Caleb Plummer, the poor old toymaker who worked for "Gruff and Tackleton." He was a strange little figure, with his old, old face, not too well shaven, his bent old back and his coat of sacking, on which the letters G and T in large capitals, and also GLASS, were printed. The poor old fellow had made himself an overcoat out of some sacks that had contained glass for the toy factory! Caleb had called to see if John Peerybingle had anything for him, and the carrier happened to have two things.

THE BOX OF DOLLS' EYES FOR CALEB'S BLIND DAUGHTER

One was a very tiny flower-pot with a plant in it, and the other a small box of dolls' eyes. Both were for Caleb's daughter, Bertha—the flower-pot as a little present, and the glass eyes for her to fit into the dolls that Caleb made.

"To think that she should never see the dolls, and them a-staring at her so bold all day long!" said Caleb. "That's where it cuts."

For Bertha, his daughter, was blind, and all his thoughts were to make her as happy as he could. Caleb was about to go away with his little parcels, when he met another visitor at the door.

DOT, THE CARRIER'S WIFE, IS STARTLED BY THE MYSTERIOUS STRANGER

This was the impudent, unpopular Tackleton himself, Caleb's employer, who had called for his wedding-cake. The last sort of man to be concerned either with toys or with weddings. He hated toys, except that he could make money by selling them. He would rather have sold ugly ones than pretty ones. Not at all a pleasant sort of man, you will see. He talked about his marriage, rattled his money in his pocket, smiled with his half-shut eye—one was always open, and the other nearly shut—and, to the amazement of John and Dot, invited them to his wedding on the last day of January, urging them also to spend a social evening with him before that date. So he went on chatting, trying in vain to make himself agreeable, saying he hated crickets—for the cricket on the hearth was merrily chirruping again—and asking John if he was sure his wife was true to him. This, of course, was just the way to make John dislike him.

Presently, however, as the deaf old Stranger got up and walked to the fireside, Dot gave out a scream which agitated everybody and wakened Caleb, who had been dozing on the wedding-cake box! She said she had only had a sudden shock; but her eyes were still fixed upon the Stranger, and John didn't feel at all easy about his wife. He was mystified as to what had frightened her.

When all the callers had gone and a bed had been made for the Stranger, the carrier sat by the fire smoking his pipe, while Dot sat on a low stool by his side; and the cricket chirped so

merrily that John felt his doubts and fears at rest again. Yet, strange to say, Dot in her fancy saw a young man standing by the fireside, just as the old Stranger had stood when she had screamed; and this young man of her imagination was saying sadly, "Married, and not to me!" So "Chirp the First" ends and leaves us puzzled.

"GRUFF & TACKLETON" INVITES CALEB AND HIS DAUGHTER TO A PARTY

When "Chirp the Second" begins, we are at the home of Caleb Plummer, a poor, mean place, full of half-made toys and devoid of all comfort, where he and his blind daughter are at work. It was just a sort of shanty stuck on to the premises of Gruff and Tackleton. "You might have knocked it down with a hammer or two and carried off the pieces in a cart." Here, amidst a most extraordinary mixture of toys in all stages of making, Caleb sat talking to Bertha, while they both were busy with their work, Caleb putting the finishing touches to a doll's house and his daughter sewing on the dress of a doll.

Presently Caleb's employer, the unattractive Tackleton, came in and told them of his intended marriage, suggesting a party beforehand, at which he wanted Bertha and Caleb to be with the Peerybingles to meet his future wife and mother-in-law.

In due time the party was held, and Tackleton made vain efforts again to be agreeable. It was clear that nobody loved him, not even his intended bride, who had consented to marry him more for her mother's sake than his own.

WHAT BEWILDERED JOHN PEERYBINGLE AT TACKLETON'S TEA-PARTY

It was a memorable party to John Peerybingle, for the scheming Tackleton tried to unsettle the honest carrier by making him doubt his dear wife, Dot, by taking him to his office, where they could see her and the Stranger — no longer old and bent, but erect and tall, holding in his hand his false white beard — in close and earnest converstation in another part of the toymaker's premises. Poor John was bewildered, and when he drove his wife, with Tilly and the baby, and the false Stranger back in his cart, his heart was heavy indeed. And that is why "Chirp the Second" ends sadly.

John Peerybingle couldn't speak to his wife of what he had seen; he sat up all night in great agony of mind, for he hated to doubt his wife, and yet he felt she was keeping some secret from him. When he was at his gloomiest the cricket began to chirp again, and, to his imagination, it seemed to become a fairy, who came and spoke to him and urged him to trust Dot with his very life. Indeed, the fairies played about him all night, and filled his thoughts with pleasant pictures of Dot to drive away the ugly ones.

When it was daylight, he went out to walk about, and soon met Tackleton, who was to be married that day. But, to cut a long story short, "Gruff and Tackleton" was not married at all, for there was no bride to meet him at the church! Yet his bride was married earlier than she had meant, and to another — the old Stranger, if you please. For he was none other than Caleb Plummer's son, who had been in a foreign country for many years, and had loved May Fielding before he went away.

DOT'S SECRET IS EXPLAINED AND THE CRICKET CHIRRUPS MERRILY AGAIN

Dear little Dot had discovered who the Stranger was through his disguise that night she screamed when he walked to the fireside, and she had been the means of May getting her first sweetheart for her husband — a far better arrangement, you will admit, than marrying old Tackleton. When John knew that was the reason of his wife being seen with the Stranger, he was delighted, you may be sure, and Tackleton's wedding-party became Edward Plummer's! But, after all, Tackleton turned out a brick, for he came to the party and admitted that he would have been a poor husband for May Fielding, saying, "Friends, one and all, my house is very lonely to-night. I've not so much as a cricket on my hearth. I have scared them all away. Be gracious to me; let me join this happy party!" This was at Peerybingle's house, and it was a very lively party indeed, for even blind Bertha, who had been told by May how poor old Caleb was, could now rejoice at the home-coming of her brother, who would put them out of want; and John Peerybingle, the carrier, nearly whisked Dot off her legs as they danced about the room, while the Cricket on the Hearth chirruped louder than ever!

THE NEXT STORIES OF FAMOUS BOOKS ARE ON PAGE 2457.

A FAMOUS POEM BY ROBERT BROWNING

IN the extremely spirited poem entitled "How They Brought the Good News from Ghent to Aix," the detail of which is so accurate, the whole picture so vivid, that we might easily imagine it to be the description of an actual episode in history, we see how the poet's imagination can create a living picture without the help of facts. For Robert Browning, in writing the poem, had no historical episode in mind, and really sought, by the art of verse, to suggest the rhythmic movement of a fine horse at a gallop. This he does to perfection, and even in this respect the poem is an effort of pure imagination, as the poet wrote it on a boat off the coast of Africa!

HOW THEY BROUGHT THE GOOD NEWS

CONTINUED FROM 2195

I SPRANG to the stirrup, and Joris, and he;
I galloped, Dirck galloped, we galloped all three.
"Good speed!" cried the watch as the gate-bolts undrew;
"Speed!" echoed the wall to us galloping through.
Behind shut the postern, the lights sank to rest,
And into the midnight we galloped abreast.

Not a word to each other; we kept the great pace
Neck by neck, stride by stride, never changing our place; [tight,
I turned in my saddle and made its girths
Then shortened each stirrup, and set the pique right, [the bit,
Rebuckled the cheek-strap, chained slacker
Nor galloped less steadily Roland a whit.

'Twas moonset at starting; but, while we drew near [clear.
Lokeren, the cocks crew and twilight dawned
At Boom a great yellow star came out to see;
At Düffeld,'twas morning as plain as could be.
And from Mecheln church-steeple we heard the half-chime, [time!"
So Joris broke silence with: "Yet there is

At Aerschot, up leaped of a sudden the sun,
And against him the cattle stood black every one, [past;
To stare through the mist at us galloping
And I saw my stout galloper, Roland, at last,
With resolute shoulders each butting away
The haze, as some bluff river headland its spray.

And his low head and crest, just one sharp ear bent back
For my voice, and the other pricked out on his track; [glance
And one eye's black intelligence—ever that
O'er its white edge at me, his own master, askance! [aye and anon
And the thick, heavy spume-flakes which
His fierce lips shook upwards in galloping on.

By Hasselt, Dirck groaned; and cried Joris, "Stay spur! [in her,
Your Roos galloped bravely, the fault's not

We'll remember at Aix"
—for one heard the quick wheeze
Of her chest, saw the stretched neck, and staggering knee,
And sunk tail, and horrible heave of the flank,
As down on her haunches she shuddered and sank.

So we were left galloping, Joris and I,
Past Loos and past Tongres, no cloud in the sky.
The broad sun above laughed a pitiless laugh,
'Neath our foot broke the brittle, bright stubble like chaff; [white,
Till over by Dalhem a dome-tower sprang
And "Gallop," cried Joris, "for Aix is in sight!"

"How they'll greet us!" and all in a moment his roan
Rolled neck and croup over, lay dead as a stone; [weight
And there was my Roland to bear the whole
Of the news which alone could save Aix from her fate,
With his nostrils like pits full of blood to the brim, [rim.
And with circles of red for his eye-sockets'

Then I cast my loose buff-coat, each holster let fall,
Shook off both my jack-boots, let go belt and all, [ear,
Stood up in the stirrup, leaned, patted his
Called my Roland his pet name, my horse without peer;
Clapped my hands, laughed and sang, any noise, bad or good, [stood.
Till at length into Aix Roland galloped and

And all I remember is friends flocking round
As I sate with his head 'twixt my knees on the ground,
And no voice but was praising this Roland of mine,
As I poured down his throat our last measure of wine,
Which (the burgesses voted by common consent)
Was no more than his due who brought good news from Ghent.

WARREN'S ADDRESS TO THE AMERICAN SOLDIERS

Was there ever a boy who did not thrill at "Warren's Address to the American Soldiers"? It was written by John Pierpont.

STAND! The ground's your own, my braves!
Will ye give it up to slaves?
Will ye look for greener graves?
Hope ye mercy still?
What's the mercy despots feel?
Hear it in that battle-peal!
Read it on your bristling steel!
Ask it,—ye who will.

Fear ye foes who kill for hire?
Will ye to your homes retire?
Look behind you! they're afire!
And, before you, see
Who have done it!—From the vale
On they come! And will ye quail?—
Leaden rain and iron hail
Let their welcome be!

In God of Battles trust!
Die we may,—and die we must;
But, O, where can dust to dust
Be consigned so well,
As where Heaven its dews shall shed
On the martyred patriot's bed,
And the rocks shall raise their head
Of his deeds to tell!

THE DESTRUCTION OF SENNACHERIB

Lord Byron wrote a number of beautiful poems, which he called "Hebrew Melodies," because he sought to express in them the feelings of the Hebrew people in their ancient days of struggle with the pagan nations around them. In this fine poem, which is one of the series, he describes with great power and imagination, and yet in plain, unaffected language, the defeat of Sennacherib, the great Assyrian king, who sought in vain to conquer the people of Israel.

THE Assyrian came down like the wolf on the fold,
And his cohorts were gleaming in purple and gold;
And the sheen of their spears was like stars on the sea,
When the blue wave rolls nightly on deep Galilee.

Like the leaves of the forest when summer is green.
That host with their banners at sunset were seen:
Like the leaves of the forest when autumn hath blown,
That host on the morrow lay wither'd and strown!

For the Angel of Death spread his wings on the blast,
And breathed on the face of the foe as he pass'd;
And the eyes of the sleepers wax'd deadly and chill,
And their hearts but once heaved, and for ever grew still!

And there lay the steed with his nostril all wide,
But through it there roll'd not the breath of his pride;
And the foam of his gasping lay white on the turf,
And cold as the spray of the rock-beating surf.

And there lay the rider, distorted and pale,
With the dew on his brow, and the rust on his mail;
And the tents were all silent, the banners alone,
The lances unlifted, the trumpet unblown.

And the widows of Ashur are loud in their wail,
And the idols are broke in the temple of Baal;
And the might of the Gentile, unsmote by the sword,
Hath melted like snow in the glance of the Lord!

THE LEAVES AND THE WIND

"COME, little leaves," said the wind one day,
"Come o'er the meadows with me and play;
Put on your dresses of red and gold,
Summer is gone, and the days grow cold."

Soon as the leaves heard the wind's loud call,
Down they came fluttering, one and all;
Over the brown fields they danced and flew,
Singing the soft little songs that they knew.

"Cricket, good-bye, we've been friends so long!
Little brook, sing us your farewell song!
Say you are sorry to see us go:
Ah! you will miss us, right well we know."

"Dear little lambs, in your fleecy fold,
Mother will keep you from harm and cold;
Fondly we've watched you in vale and glade;
Say, will you dream of our loving shade?"

Dancing and whirling, the little leaves went;
Winter had called them, and they were content.
Soon fast asleep in their earthy beds,
The snow laid a coverlet over their heads.

—GEORGE COOPER.

SERENADE

This beautiful little "Serenade" was written by our well-loved poet, Henry Wadsworth Longfellow, and has been put to music.

STARS of the summer night!
Far in yon azure deeps,
Hide, hide your golden light!
She sleeps!
My lady sleeps!
Sleeps!

Moon of the summer night!
Far down yon western steeps,
Sink, sink in silver light!
She sleeps!
My lady sleeps!
Sleeps!

Wind of the summer night!
Where yonder woodbine creeps,
Fold, fold thy pinions light!
She sleeps!
My lady sleeps!
Sleeps!

Dreams of the summer night!
Tell her, her lover keeps
Watch! while in slumbers light
She sleeps!
My lady sleeps!
Sleeps!

SHERIDAN'S RIDE

This stirring poem by T. Buchanan Read, which describes an incident in the Civil War, takes us off our feet by its swing and gallop, and is a great favorite with many school children.

UP from the South at break of day,
Bringing to Winchester fresh dismay,
The affrighted air with a shudder bore,
Like a herald in haste, to the chieftain's door,
The terrible grumble, and rumble, and roar,
Telling the battle was on once more—
And Sheridan twenty miles away.
And wider still those billows of war
Thundered along the horizon's bar;
And louder yet into Winchester rolled
The roar of that red sea uncontrolled,
Making the blood of the listener cold,
As he thought of the stake in that fiery fray—
And Sheridan twenty miles away.

But there is a road from Winchester town,
A good, broad highway leading down;
And there, through the flush of the morning light,
A steed as black as the steeds of night
Was seen to pass as with eagle flight;
As if he knew the terrible need,
He stretched away with his utmost speed;
Hills rose and fell; but his heart was gay,
With Sheridan fifteen miles away.

Still spring from those swift hoofs, thundering South,
The dust, like smoke from the cannon's mouth,
Or the trail of a comet, sweeping faster and faster,
Foreboding to traitors the doom of disaster.
The heart of the steed and the heart of the master,
Were beating like prisoners assaulting their walls,
Impatient to be where the battlefield calls;
Every nerve of the charger was strained to full play,
With Sheridan only ten miles away.

Under his spurning feet the road,
Like an arrowy Alpine river flowed,
And the landscape sped away behind
Like an ocean flying before the wind,
And the steed, like a bark fed with furnace fire,
Swept on, with his wild eye full of fire.
But lo! He is nearing his heart's desire:
He is snuffing the smoke of the roaring fray,
With Sheridan only five miles away.

The first that the general saw were the groups
Of stragglers, and then the retreating troops.
What was done—what to do? A glance told him both.
Then, striking his spurs, with a terrible oath
He dashed down the line, 'mid a storm of huzzas,
And the wave of retreat checked its course there, because
The sight of the master compelled it to pause.
With foam and with dust the black charger was grey;
By the flash of his eye, and the red nostrils' play,
He seemed to the whole great army to say:
"I have brought you Sheridan all the way
From Winchester town to save the day."

Hurrah! hurrah for Sheridan!
Hurrah! hurrah for horse and man!
And when their statues are placed on high,
Under the dome of the Union sky,
The American soldiers' Temple of Fame,
There, with the glorious general's name,
Be it said, in letters both bold and bright:
"Here is the steed that saved the day,
By carrying Sheridan into the fight,
From Winchester, twenty miles away!"

THE DEATH OF NAPOLEON

WILD was the night, yet a wilder night
Hung around the soldier's pillow;
In his bosom there waged a fiercer fight
Than the fight on the wrathful billow.

A few fond mourners were kneeling by,
The few that his stern heart cherished;
They knew, by his glazed and unearthly eye,
That life had nearly perished.

They knew by his awful and kingly look,
By the order hastily spoken,
That he dreamed of days when the nations shook,
And the nations' hosts were broken.

He dreamed that the Frenchman's sword still slew,
And triumphed the Frenchman's eagle,
And the struggling Austrian fled anew
Like the hare before the beagle.

The bearded Russian he scourged again,
The Prussian's camp was routed,
And again on the hills of haughty Spain
His mighty armies shouted.

Over Egypt's sands, over Alpine snows,
At the pyramids, at the mountain,
Where the wave of the lordly Danube flows,
And by the Italian fountain,

On the snowy cliffs where mountain streams
Dash by the Switzer's dwelling,
He led again, in his dying dreams,
His hosts, the broad earth quelling.

Again Marengo's field was won,
And Jena's bloody battle;
Again the world was overrun,
Made pale at his cannon's rattle.

He died at the close of that darksome day,
A day that shall live in story;
In the rocky land they placed his clay,
"And left him alone with his glory."

—ISAAC MCLELLAN.

GROW old along with me!
The best is yet to be,
The last of life, for which the first was made:
Our times are in his hand
Who saith "A whole I plann'd.
Youth shows but half; trust God: see all nor be afraid!"

—ROBERT BROWNING.

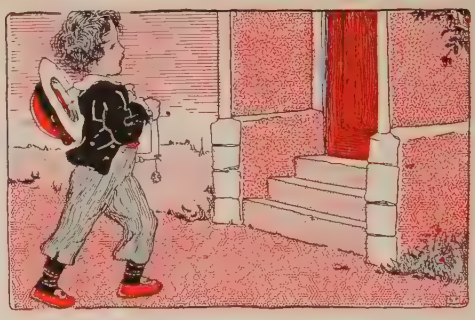
LITTLE VERSES FOR VERY LITTLE PEOPLE

JIM and George were two great lords,
They fought all in a churn;
And when that Jim got George by the nose,
Then George began to grin.

ELIZABETH, Elspeth, Betsy, and Bess,
They all went together to seek a bird's nest,
They found a bird's nest with five eggs in,
They all took one, and left four in.

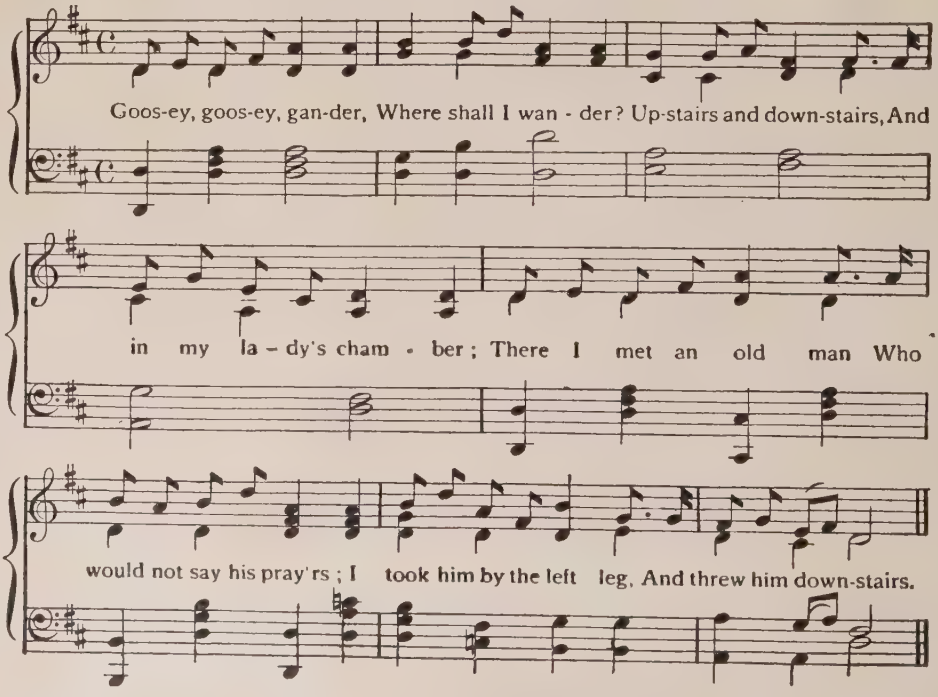
THE King of France, and four thousand men,
They drew their swords and put them up again.

A DILLER, a dollar,
A ten o'clock scholar,
What makes you come so soon?
You used to come at ten o'clock,
But now you come at noon.



I HAD a little nut-tree, nothing would it bear
But a silver nutmeg and a golden pear.
The King of Spain's daughter came to visit me,
And all was because of my little nut-tree.
I skipped over water, I danced over sea,
And all the birds in the air couldn't catch me.

GOOSEY GOOSEY, GANDER


Goos-ey, goos-ey, gan-der, Where shall I wan - der? Up-stairs and down-stairs, And
in my la - dy's cham - ber; There I met an old man Who
would not say his pray'rs; I took him by the left leg, And threw him down-stairs.

MY·FATHER·HE·DIED·AND·I·CANT·TELL·YOU·HOW

MY father, he died, but I can't tell you how;
He left me six horses to drive in my plough:
With my wing, wang, waddle, oh,
Jack sing, saddle, oh,
Blowsey boys, bubble, oh,
Under the broom.

I sold my six horses, and I bought me a cow;
I'd fain have made my fortune, but did not know how:
With my wing, wang, waddle, oh,
Jack sing, saddle, oh,
Blowsey boys, bubble, oh,
Under the broom.

I sold my cow, and I bought me a calf;
I'd fain have made a fortune, but lost the best half:
With my wing, wang, waddle, oh,
Jack sing, saddle, oh,
Under the broom.

I sold my calf, and I bought me a cat;
A pretty thing she was, in my chimney corner sat:
With my wing, wang, waddle, oh,
Jack sing, saddle, oh,
Under the broom.

I sold my cat, and bought me a mouse;
He carried fire in his tail, and burnt down my house:
With my wing, wang, waddle, oh,
Jack sing, saddle, oh,
Blowsey boys, bubble, oh,
Under the broom.

THE VOICE OF THE CUCKOO CAME FROM THE FIRE

The brothers, Scrub and Spare, were sitting before the fire, when suddenly from out the flames they heard the spring bird's voice saying "Cuckoo! cuckoo!" "It is something bad," said Scrub, very frightened.

THE COBBLERS & THE CUCKOO

A TALE FROM GRANNY'S WONDERFUL CHAIR

CONTINUED FROM 2186

ONCE upon a time there stood in the midst of a cold, bleak moor, in the far North Country, a certain village; all its inhabitants were poor, for their fields were barren, and they had little trade. But the poorest of them all were two brothers called Scrub and Spare, who followed the cobbler's craft, and had but one stall between them. It was a hut built of clay and wattles. There they worked in most brotherly friendship, though with little encouragement.

The people of that village were not extravagant in shoes, and better cobblers than Scrub and Spare might be found. Nevertheless, Scrub and Spare managed to live between their own trade, a small barley field, and a cottage garden, till one unlucky day when a new cobbler arrived in the village. He had lived in the capital city of the kingdom, and, by his own account, cobbled for the queen and the princesses. His awls were sharp, his lasts were new; he set up his stall in a neat cottage with two windows.

The villagers soon found out that one patch of his would outwear two of the brothers'. In short, all the mending left Scrub and Spare, and went to the new cobbler. So the brothers were poor that winter, and when Christmas came they had nothing to feast on but a barley loaf, a piece of musty bacon, and some small beer of their own brewing. They, however, made a great fire of logs, which crackled and blazed with red embers, and in high glee the cobblers sat down to their beer and bacon. The door was shut, for there was nothing but cold moonlight and snow outside; but the hut, strewn with fir boughs, and ornamented with holly, looked cheerful as the ruddy blaze flared up and rejoiced their hearts.

"Long life and good fortune to ourselves, brother!" said Spare. "I hope you will drink that toast, and may we never have a worse fire on Christmas—but what is that?"

Spare set down the drinking-horn, and the brothers listened astonished, for out of the blazing root they heard "Cuckoo! cuckoo!" as plain as ever the spring bird's voice came over the moor on a May morning.

"It is something bad," said Scrub, terribly frightened.

"Maybe not," said Spare.

And out of the deep hole at the side which the fire had not reached flew a large grey cuckoo, and lit on the table before them. Much as the cobblers had been surprized, they were still more so when the bird began to speak.

"Good gentlemen," it said slowly, "can you tell me what season this is?"

"It's Christmas," answered Spare.

"Then a merry Christmas to you!" said the cuckoo. "I went to sleep in the hollow of that old root one evening last summer, and never woke till the heat of your fire made me think it was summer again; but now, since you have burned my lodging, let me stay in your hut till the spring comes round—I only want a hole to sleep in—and when I go on my travels next summer be assured that I will bring you some present for your trouble."

"Stay, and welcome," said Spare. "I'll make you a good warm hole in the thatch. But you must be hungry after that long sleep. Here is a slice of barley bread. Come, help us to keep Christmas!"

The cuckoo ate up the slice, drank water from the brown jug—for he would take no beer—and flew into a snug hole which Spare scooped for him in the thatch of the hut. So the snow melted, the heavy rains came, the cold grew less, the days lengthened, and one sunny morning the brothers were awakened

SCRUB AND FAIRFEATHER HAD A WEDDING FEAST, AT WHICH ALL THE VILLAGE DANCED

by the cuckoo shouting its own cry to let them know that at last the spring had come.

"Now," said the bird, "I am going on my travels over the world to tell men of the spring. There is no country where trees bud or flowers bloom that I will not cry in before the year goes round. Give me another slice of barley bread to keep me on my journey, and tell me what present I shall bring you at the end of the twelve months."

"Good Master Cuckoo," said Scrub, "a diamond or pearl would help such poor men as my brother and I to provide something better than barley bread for your next entertainment."

"I know nothing of diamonds or pearls," said the cuckoo; "they are in the hearts of rocks and the sands of rivers. My knowledge is only of that which grows on the earth. But there are two trees hard by the well that lies at the world's end. One of them is called the golden tree, for its leaves are all of beaten gold. As for the other, it is always green, like a laurel. Some call it the wise, and some the merry tree. Its leaves never fall, but they that get one of them keep a blithe heart in spite of all misfortunes, and can make themselves as merry in a poor hut as in a handsome palace."

"Good Master Cuckoo, bring me a leaf off that tree!" cried Spare.

"Now, brother, don't be foolish!" said Scrub. "Think of the leaves of beaten gold! Dear Master Cuckoo, bring me one of them."

Before another word could be spoken the cuckoo had flown.

The brothers were poorer than ever that year; nobody would send them a single shoe to mend. The new cobbler said, in scorn, they should come to be his apprentices; and Scrub and Spare would have left the village but for their barley field, their cabbage garden, and a maid called Fairfeather, whom both the cobblers had courted for more than seven years.

At the end of the winter Scrub and Spare had grown so poor and ragged that Fairfeather thought them beneath her notice. Old neighbors forgot to invite them to wedding feasts or merry-makings; and they thought the cuckoo had forgotten them too, when at day-break, on the first of April, they heard a hard beak knocking at their door, and a voice crying:

"Cuckoo! cuckoo! Let me in."

Spare ran to open the door, and in came the cuckoo, carrying on one side of his bill a golden leaf, larger than that of any tree in the North Country; and in the other, one like that of the common laurel, only it had a fresher green.

"Here!" it said, giving the gold to Scrub and the green to Spare.

So much gold had never been in the cobbler's hands before, and he could not help exulting over his brother.

"See the wisdom of my choice," he said, holding up the large leaf of gold. "As for yours, as good might be plucked from any hedge. I wonder a sensible bird should carry the like so far."

"Good Master Cobbler," cried the cuckoo, finishing the slice, "your conclusions are more hasty than courteous. If your brother be disappointed this time, I go on the same journey every year, and, for your hospitable entertainment, will think it no trouble to bring each of you whichever leaf you desire."

"Darling cuckoo," cried Scrub, "bring me a golden one."

And Spare, looking up from the green leaf on which he gazed, said:

"Be sure to bring me one from the merry tree."

And away flew the cuckoo once again.

Scrub vowed that his brother was not fit to live with a respectable man; and taking his lasts, his awls, and his golden leaf, he left the wattle hut, and went to tell the villagers.

They were astonished at the folly of Spare, and charmed with Scrub's good sense, particularly when he showed them the golden leaf, and told them that the cuckoo would bring him one every spring. The new cobbler immediately took him into partnership; the greatest people sent him their shoes to mend; Fairfeather smiled graciously upon him, and in the course of that summer they were married, with a grand wedding feast, at which the whole village danced, except Spare, who was not invited.

As for Scrub, he established himself with Fairfeather in a cottage close by that of the new cobbler, and quite as fine. There he mended shoes to everybody's satisfaction, had a scarlet coat for holidays, and a fat goose for dinner

every wedding-day anniversary. Spare lived on in the old hut and worked in the cabbage garden. Every day his coat grew more ragged, and the hut more weather-beaten; but people remarked that he never looked sad or sour; and the wonder was that, from the time they began to keep his company, the tinker grew kinder to the poor ass with which he traveled the country, the beggar-boy kept out of mischief, and the old woman was never cross to her cat or angry with the children.

I know not how many years passed in this manner, when a certain great lord, who owned that village, came to the neighborhood. His castle was ancient and strong, with high towers and a deep moat. All the country, as far as one could see from the highest turret, belonged to this lord; but he had not been there for twenty years, and would not have come then, only he was melancholy.

The cause of his grief and sorrow was that he had been Prime Minister at court, and in high favor, till somebody told the Crown Prince that he had spoken disrespectfully concerning the turning out of his Royal Highness's toes, whereon the North Country lord was turned out of office, and banished to his own estate. There he lived for some weeks in very bad temper; but one day in the harvest time his lordship chanced to meet Spare gathering watercresses at a meadow stream, and fell into talk.

How it was nobody could tell, but from the hour of that discourse the great lord cast away his melancholy, and went about with a noble train, making merry in his hall, where all travelers were entertained and all the poor were welcome.

This strange story soon spread through the North Country, and a great company came to the cobbler's hut—rich men who had lost their money, poor men who had lost their friends, beauties who had grown old, wits who had gone out of fashion—all came to talk with Spare, and, whatever their troubles, all went home merry. The rich gave him presents, the poor gave him thanks.

By this time his fame had reached the court. There were a great many discontented people there besides the King, who had lately fallen into ill-humor because a neighboring princess, with seven islands for her dowry, would not marry his eldest son. So a royal messenger was sent to Spare, with a command that he should go to court.

"To-morrow is the first of April," said Spare, "and I will go with you two hours after sunrise."

The messenger lodged all night at the castle, and the cuckoo came at sunrise with the merry leaf.

"Court is a fine place," he said, when the cobbler told him he was going; "but I cannot go there—they would lay snares and catch me. So be careful of the leaves I have brought you, and give me a farewell slice of barley bread."

Spare was sorry to part with the cuckoo, but he gave him a thick slice, and, having sewed up the leaves in the lining of his leather doublet, he set out with the messenger on his way to the royal court.

His coming caused great surprize; but scarce had his Majesty conversed with him half an hour when the princess and her seven islands were forgotten, and orders given that a feast for all comers should be spread in the banquet hall. The princes of the blood, the great lords and ladies, Ministers of State, and judges of the land, after that discoursed with Spare, and the more they talked the lighter grew their hearts, so that such changes had never been seen.

As for Spare, he had a chamber assigned him in the palace, and a seat at the King's table; one sent him rich robes and another costly jewels; but in the midst of all his grandeur he still wore the leathern doublet, which the palace servants thought remarkably mean. One day the King's attention being drawn to it by the chief page, his Majesty inquired why Spare didn't give it to a beggar. But the cobbler said:

"High and mighty monarch, this doublet was with me before silk and velvet came—I find it easier to wear than the court cut; moreover, it serves to keep me humble, by recalling the days when it was my holiday garment."

The King thought this a wise speech, and commanded that no one should find fault with the leathern doublet. So things went, and Spare prospered at court until the day when he lost his doublet, of which we read in that part of this book beginning on page 2398.

STORIES OF GREECE AND ROME

THERE are many stories of ancient Greece and Rome that will be told over and over again so long as mankind loves to listen to the telling of tales. These stories are sometimes true, or historical, and sometimes imaginary, or legendary; but, whether truth or fable, they are always full of interest and charm. We shall read both kinds of tales from time to time, and we cannot fail to profit by them, for they always teach as well as entertain, which all good stories should do.

THE FOOLISH EMPEROR & HIS FOWLS

IN old days, the most important person in the world was the Roman Emperor. There are plenty of kings and emperors nowadays, and there is plenty for them to do in making good laws, and seeing that people keep them.

But the Roman Emperor used to be more important, because he had to look after everyone in his empire, which was a very big one indeed. But once there was an emperor whose name was Honorius, and that was just at a time when the whole empire was in very great danger.

But Honorius paid no heed to that; the only things he thought really interesting were cocks and hens and chickens! So when his Ministers or great officers of the court or the army came to him to ask what they were to do, he would say: "Go away and wait. Can't you see that I have to feed my chickens?"

Nobody was sorry when the Emperor died and was no longer the most important person in the world.

THE TALE OF THE DUTIFUL SONS

IN the ancient city of Argos there abode with their mother two young men whose names were Cleobis and Bito, who were famous through the land for their skill in all manly sports.

Now, there was a festival in honor of the greatest of the goddesses, Hera, the wife of Zeus, and it behoved the mother of those twain that she should be drawn in a chariot to the temple of the goddess.

But when there was tarrying of the oxen which were to have drawn the chariot after the Greek manner, her two sons made haste and yoked themselves to the car, and drew it to the temple, which was many miles away, and all men's mouths were full of the praises of the young men.

Then was their mother's heart filled with joy, and she prayed to the goddess, saying: "Queen of gods and men, grant to my two noble sons the greatest blessing thou canst bestow on mortal man."

But when the festival was finished, Cleobis and Bito lay down in the temple to sleep, and behold, in the morning the spirits had departed out of their bodies, and this was accounted the answer of the goddess to the prayer of their mother; because to mortals the gods can grant no greater boon than to take them to dwell with the immortals.

THE SACRIFICE OF MARCUS CURTIUS

ONCE on a time in ancient Rome it befell that many troubles came upon the state, and men said that the gods must be wroth; but when one day there was a terrible noise of grinding and roaring and a great chasm opened in the ground, they were sure of it.

Therefore they consulted an oracle, to learn how the anger of the gods might be appeased, and the oracle made answer: "When Rome's greatest treasure is cast into the chasm, it will be closed again, for a sign that the gods are angry no more." But none could tell what the greatest treasure was, so there was great lamentation.

Then a young and valiant soldier, whose name was Marcus Curtius, said: "Surely Rome has no greater treasure than the lives of the citizens who are willing to die for their country!" So he arrayed himself in his armor, and mounted his war-horse, and leaped into the chasm, and then the chasm closed, and was henceforth called Lake Curtius, for Rome could make no greater sacrifice than the willing death of her noblest son.

A WARNING TO DANCERS

THERE was a certain rich man called Clisthenes who had a fair daughter, and from all Greece came wooers, among whom Hippoclides found favour.

Then Clisthenes gave a great feast to all the suitors, declaring that thereafter he would make known which of them he had chosen for his daughter. But when they waxed merry with feasting, Hippoclides began to dance, and when he leaped on a table and began to walk on his hands, Clisthenes cried out: "Have a care, Hippoclides! You are dancing away your marriage." But "What cares Hippoclides?" quoth he, upside down, with wagging legs. So Hippoclides was sent packing, and another suitor won the coveted prize.

THE WISEST MAID IN WESSEX

IN the ancient days there was a King of Wessex, whose name was Ina. He was a tall, brave, handsome man, but he had a great failing. The least thing irritated him and threw him into a sudden fit of wild anger. Knowing this, he resolved to marry a wise maiden who could restrain him and govern him. One afternoon he rode out from Winchester into the great forest, and, feeling thirsty, he stopped at a woodman's hut to get a drink of milk. The woodman's pretty daughter Edith brought him some milk, and when he gave her back the mug he said:

"I am King Ina of Wessex. Empty all the seas of the world with this mug, and I will make you my Queen."

Edith went into the hut, and brought out a handful of tow, and gave it to King Ina, saying merrily:

"Stop up with this tow all the rivers, and I will do as you wish."

"You are the girl I've been looking for," said King Ina.

And he set her upon his horse, and led her to his palace at Winchester. But just before they were married Edith said to him:

"You know you have a very hasty temper. So promise that if you are ever angry with me and send me out of the palace you will let me take a parting gift away with me."

King Ina, of course, agreed to this. As they were sitting at supper one night, Ina was offended by some good advice which his wife gave him, and he cried:

"You interfere too much in my affairs. To-morrow you go back with your father to the hut."

When her husband's back was turned, she put a drug into the mead he was drinking, and this made him fall into a deep sleep, and then she had him carried softly to the hut in the forest.

"Who brought me here?" he shouted, on awakening the next morning.

"I did, dearest," said Queen Edith. "You are my parting gift."

"Ah!" said King Ina, kissing her. "I did well in marrying the prettiest maid in Wessex, and also the wisest!"

THE FAIRY MAID OF VAN LAKE

A SHEPHERD lad from Mothvey was tending his sheep one afternoon beside Van Lake, in the Black Mountains of Wales, when three fairy maids came out of the water and began to play on the grass. All were beautiful with a beauty never seen on a mortal face, but the youngest was the loveliest; and the shepherd fell in love with her, and won her as his bride. On the wedding-day the fairy came out of Van Lake, and brought, as a dowry, three cows, two oxen, and a bull, and the marriage was joyfully celebrated at Mothvey Church.

"Now mind," said the fairy maid to her husband, "if ever you strike me three times without cause, I shall have to return to Van Lake."

The shepherd said he would never dream of touching her, and they lived happily together, and three little boys were born to them. But when he asked his wife to go for a horse for them to ride to the christening, she quite forgot to do so, and, without thinking about her threat, he slapped her on the shoulder, telling her to do as she had been bidden.

"That's one," said the fairy.

Soon afterwards they went to a wedding, and instead of merrymaking the fairy cried all the time, just as though she were at a funeral and everybody was sad.

"Why do you cry?" said the shepherd, slapping her on the shoulder.

"Because the marriage will prove unhappy," she replied. "And mind! You have now struck me twice."

The shepherd became very careful, for he certainly was very anxious not to lose his wife, but later, at a funeral, his wife shocked everybody by laughing and dancing. Quite forgetting himself, the shepherd tapped her, saying:

"Is this a time for rejoicing?"

"Yes," said the fairy. "The baby has escaped the sorrows of earth and entered the Kingdom of Heaven. But that's the third blow. Farewell!"

As she entered Van Lake her cattle followed her. When her three sons grew up, however, the fairy maid appeared again, and gave them the gift of healing, and they all became famous physicians.

THE FABLES OF ÆSOP THE SLAVE

THE FARMER AND HIS SONS

AN old farmer lay very ill, and it was soon seen that he was going to die. So he called his two sons, and said:

"My boys, all the fortune that I have to leave you is my farm and fields, which I give to you in equal shares; but you are on no account to let the ground pass out of your own occupation, for whatever treasure I have besides lies buried somewhere in the ground within a foot or two of the surface."

The two sons thought that their father was talking about some money that he had buried; so after his death they set to work and carefully dug every

inch of the ground. They found no buried treasure, but the result of their digging was that the ground was so well stirred and turned over that it produced splendid crops, and the two sons were well repaid for their trouble.

The way to get rich is to work hard.

THE FOX AND THE MASK

A FOX was walking along one day when, by the roadside, he found a mask, carved in the shape of a man's face. He picked it up and looked at it

carefully, then he turned it over and found that it was hollow inside. The fox then laughed, and said: "What a pity it is that such a wise-looking head should have no brain inside it!"

Good looks are worth nothing without good sense.

THE BOYS AND THE FROGS

A PARTY of mischievous boys were playing in a field near a pond. When they got tired of running about, they gathered at the side of the pond

and amused themselves by throwing stones at the unfortunate frogs as often as they showed their heads above water.

At last an old frog put his head out, and said: "Boys, you don't seem to remember that, though this may be play to you, it is death to us."

Never play games which are cruel.

THE WOLF IN SHEEP'S CLOTHING

A WOLF one day dressed himself in the skin of a sheep, and so was able to creep in among the flock and kill and eat a great many of them.

One day the shepherd found him out, and, tying a rope about his neck, hung

him to the branch of a tree by the roadside. Some other shepherds passing by asked the man what he meant by hanging one of his sheep; but when he showed them that it was really a wolf dressed up as a sheep, they all agreed that the animal deserved his fate.

Hypocrites always get found out.

A BOX OF GOOD LUCK

A GENTLEMAN in France was walking one day through the streets when he saw a pretty little "twist" in a baker's shop-window.

"That is the very thing to tempt my poor little girl," he said, and went into the shop to buy the pretty bread for his invalid child.

While he was waiting for his change, a little mite of a boy, six or seven years of age, very poor, but neatly dressed, entered the shop.

"Madame," he said to the baker's wife, "mamma has sent me here to fetch a loaf."

"Have you any money?" she said, with a smile, placing an immense loaf in the little arms.

"No, madame; but mamma says she will come and speak to you to-morrow."

"All right; run away with your loaf."

"Thank you, madame," said the child.

The gentleman received his change, and was just about to leave the shop when he discovered the little boy still standing behind him.

"Hallo!" said the baker's wife, "are you still there? What is the matter? Doesn't the loaf suit you?"

"Oh, yes!" replied the boy.

"Then carry it to your mother," said the woman. "If you are late, she will scold you for loitering."

The child did not seem to hear. Something held him spellbound. The baker's wife went up to him and tapped his cheek.

"Come, what are you dreaming about?"

"Madame," said the child, "who is it that sings here?"

"No one."

"Yes; listen!"

The baker's wife and the gentleman both listened, but could hear no singing, only the chirping of the crickets, which are found in French bakeries.

"It is a little bird," whispered the boy; "or perhaps the bread sings in the oven, like the apples."

The baker's wife laughed.

"That is nothing but the crickets, my little man."

"Crickets!" cried the boy. "Are they really crickets?" He blushed suddenly scarlet. "Oh, madame," he said eagerly, "I should be so happy if you would only give me a cricket!"

"Why, what do you want with a cricket? I should be glad if I could give you all I have in the house."

"Oh, madame, only one, if you will!" said the child, putting his hands together above his loaf. "Someone told me crickets bring good luck to houses; perhaps if we had one at home, my poor mamma, who is so sad and ill, would never cry any more."

The gentleman looked at the baker's wife. She was wiping a tear away.

"And why does your mother cry, little man?" he asked gently.

"It is the bills," answered the child. "My daddie is dead, and my mother has to work hard because of these bills."

The gentleman took the little boy in his arms and kissed him. The woman went to the bakery; she was afraid to touch the crickets herself, but she got her husband to catch four and put them in a box with holes in the lid for them to breathe through; then she brought the box to the child, who received it with a kind of joyful awe. He went out like someone in a dream.

When he was gone, "Poor little chap," said the gentleman and the woman together. She went to her desk, opened the book at the page where the widow's account for bread was written, and, drawing a pen through it, wrote at the bottom "Paid."

The gentleman took out all his silver, and, giving it to the baker's wife, said: "Will you place this money in the receipted bill and send it to the poor widow, with a note saying that one day her child will certainly grow up to be a joy to her and a help?"

This was done. A long-legged baker's boy set off at a good trot, and arrived at the sad and humble home long before the little mite with his big loaf and his box of crickets.

When the child did arrive, he found his mother (for the first time since his father's death) joyous and gay. Immediately he thought to himself: "It is the crickets."

And it is really quite certain that but for those crickets and his own good heart this happy change of fortune would never have taken place.

RAPUNZEL'S GOLDEN LADDER

A YOUNG Prince was hunting one day in a forest in Germany, when he heard a girl singing sweetly and sadly to herself. He followed the sound, and came to a tower in which there was no door or stairs. As he stood among the trees, wondering where the entrance was, a Witch hobbled up and sang:

"Rapunzel! Rapunzel!
Let down your hair."

A lovely maiden at once came to the window at the top of the tower, and unbound her golden tresses, and they were so long that they touched the ground, and the Witch slowly climbed up them.

"Ah," said the Prince, "I will use that golden ladder!"

When the Witch departed, he also sang:

"Rapunzel! Rapunzel!
Let down your hair."

Rapunzel did so, and he ascended. But, oh, how startled she was when he appeared! She had never seen a man before. The Witch had taken her from her parents when she was a baby, and put her in the tower, and there she had grown up all alone. The Prince talked to her so lovingly that her heart was soon won, and she promised to marry him.

"Now, my dearest," said the Prince, when it grew dark, "I must find a silken ladder by which you may escape. I will bring it to-morrow when the Witch has gone away."

Unhappily, Rapunzel was very simple-minded. When the Witch came and climbed up her hair, she said:

"How long you take, granny! The Prince climbs up in an instant."

"What!" said the Witch, raging with anger. "After all the trouble I have taken to keep you separate from the world, you let down your hair for a man to climb up! You must die!"

Seizing a pair of scissors, she cut off Rapunzel's hair, and led her into a desert, and left her there to perish. The Witch then returned to the tower, and climbed up by means of the golden tresses, which she had tied round the window-bar.

"Ah," said the Prince, "I will use that golden ladder."

"Rapunzel! Rapunzel!
Let down your hair,"

sang the Prince, as he came through the forest, carrying a silken ladder. Then, seeing the tresses, he gaily climbed up, and entered the room.

"Ah, ah!" shrieked the Witch, as she saw him looking around for Rapunzel. "The pretty little bird isn't in the nest. The cat has killed it, and the cat is going to scratch your eyes out."

She pushed the Prince, and he tumbled out of the window, and fell on a bush, and the thorns pierced his eyes. After wandering blindly about the forest, he came to the desert, and heard Rapunzel singing sweetly and softly to herself.

He followed the sound, and she saw him, and ran up and fell upon his neck weeping, and two of her tears wetted his eyes, and he recovered his sight.

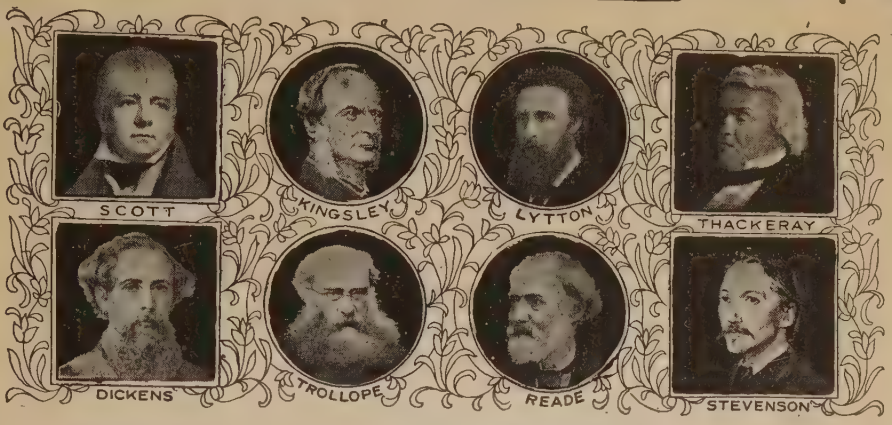
The bad old Witch, who had been watching from the top of the tower, saw the lovers meet, and she was so angry at their happiness that her rage choked her, and she died.

The Prince at once led Rapunzel to his father's kingdom, and there they were joyfully married in great splendor.

THE NEXT STORIES BEGIN ON PAGE 2395.

DICKENS AND SOME PEOPLE FROM HIS BOOKS

We here see Charles Dickens as a boy, pasting labels on blacking-boxes, and later as the world-famous novelist he became. In the background we have a glimpse of some of the characters he described in his stories. Just above his chair peeps Dolly Varden, and Pickwick, old Mr. Weller and Sam, his son, and Mrs. Gamp are all near by. Then there is Grip, the raven, with Oliver Twist and Bill Sikes, Florence Dombey, and Little Nell and her grandfather. The man in the hat is Mr. Micawber, and at his side is Uriah Heep.



THE GREAT STORY-TELLERS

FAMOUS BRITISH WRITERS OF THE LAST CENTURY

CONTINUED FROM 2170

THE last of the famous story-tellers about whom we read on page 1752 was Oliver Goldsmith, whose death occurred in the year 1774. Three years before that time a boy was born in Edinburgh who was to become the greatest of all our story-tellers. His name was Walter Scott, and his birthday was August 15, 1771. Though born in the eighteenth century, we do not consider Walter Scott as a novelist of that century, for he was only twenty-nine years of age when the nineteenth century began, and he had not yet written any of his famous stories.

It was, indeed, a remarkable, and in some respects a heroic, life that began that August day in one of the narrow streets of old Edinburgh, where the father of the new baby, who was fated to make his name illustrious, was a well-known member of the legal profession. This little Walter Scott, although an uncommonly healthy child, found his troubles begin soon enough, for when he was only some eighteen months old he lost the power of his right leg, and many years were to be spent by his anxious parents in trying everything that could be done to restore the use of his limb. Success attended their efforts in the end, and, although Walter was doomed to go lame through life, as he grew into lusty boyhood the use of his leg came back to him so well that he could even join with his playmates in the dangerous sport of climbing up the famous Castle Hill that stands proudly in the midst of his native town.

When he was eight years old, young Walter was sent to the High School, and from all accounts he did nothing to distinguish himself there, nor did he do much better at the University. His schoolmasters had very little hope that their lame pupil would ever make himself famous; but they were merely reckoning without the important knowledge that Walter was a genius, and therefore not to be judged by the rules by which ordinary people may be judged. But if Walter Scott learned little Latin and less Greek at the High School and at the University of Edinburgh, he had learned many things that were to prove even more useful to him in after life. His appetite for reading could never be satisfied and he himself has told us that probably no boy of his age had read so much, but chiefly of the old legends and romances, as his imagination from the first was most keenly interested in everything of a romantic nature.

He had a friend who was also of like mind, and the two used to compose romances for each other's amusement, rehearsing their juvenile compositions aloud as they wandered among the solitary places of Arthur's Seat and Salisbury Crags, those picturesque hills that tower beyond historic Holyrood.

THE LAME SCHOOLBOY AND THE ROMANTIC TOWN IN WHICH HE LIVED

Edinburgh in those days was just the place to kindle the imagination of a romantic boy, who would find at almost every turn among its grey and narrow streets, with their tall and sombre buildings, landmarks of Scotland's thrilling history, many of which, in the great changes of the nineteenth century, have disappeared.

If Walter Scott was not a brilliant schoolboy nor a successful student, that must have been because his mind was roving in the fairy realms of old romance and history, for when the time came to open the gates into other realms of fancy, which could only be done by the key of foreign languages, he applied himself so well that he speedily learnt French and Italian, in order to read the romances written in these tongues. For poetry he had also a passion as a boy, and long legends in verse he could read with as keen a relish as a boy of to-day will read a stirring detective story.

When he was about fourteen years of age, Walter Scott entered his father's office, and seven years later he was qualified as an advocate, but he did not possess those powers of oratory which are necessary for success in that branch of the profession. He was only twenty-five when his first literary work appeared, a book of ballads adapted from a German author.

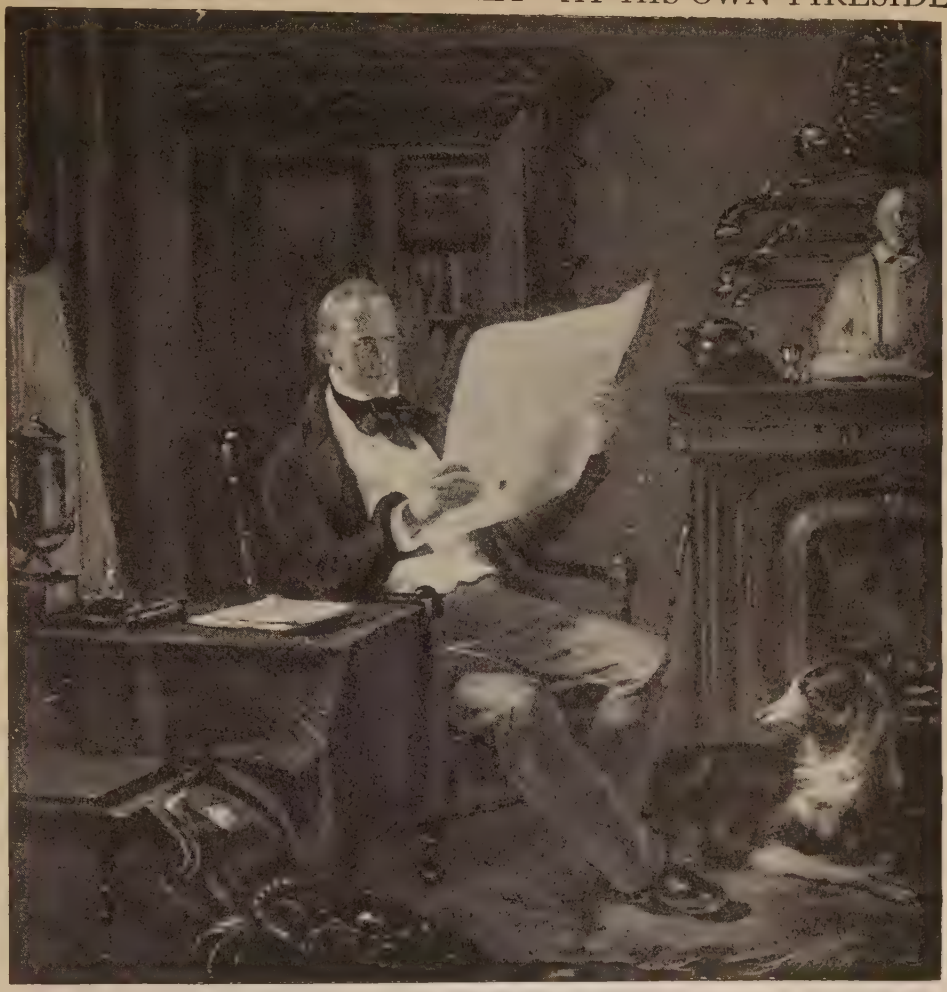
HOW WALTER SCOTT BEGAN BY GATHERING OLD POEMS FOR HIS BOOKS

He was already at work, whenever he could get the opportunity, gathering legends and ballads among the old-fashioned folk of the Scottish borderland, from which part of the country his ancestors had come. And in the year 1802 the results of these gatherings of song and legend were seen when the first volume of his famous "Border Minstrelsy" was published.

Three years later his own original poem, "The Lay of the Last Minstrel," made his name famous throughout the land. It was thus, as a teller of stories

SIR WALTER SCOTT FINDING THE LOST STORY THAT MADE HIM FAMOUS

THE AUTHOR OF "WAVERLEY" AT HIS OWN FIRESIDE



This picture, by Sir William Allan, shows Sir Walter Scott reading a proclamation of Mary Queen of Scots.

in verse, that Walter Scott first made his mark, and his next great work, "Marmion," was also a long and stirring poem. Many stories are told of his wonderful power to work in later years, but there surely never was a busier author than he even in those earlier years of which we are speaking, when he was not only writing the poems we have named, and, above all, "The Lady of the Lake," which appeared in 1810, but was editing the works of many earlier authors, writing their biographies, discharging an important legal office, starting the famous "Quarterly Review," engaging in farming, and beginning the construction of the fine mansion house of Abbotsford. The lame boy, you see, had proved a very giant of a man, and yet he had not set his hand to his greatest work. He had already tried his hand at a long story of Scottish life and character dealing with the generation before his own—that is to say, the lifetime of his father—but the manuscript of this story he had mislaid. But, rummaging one day in the drawer of an old writing-table, Scott came upon the missing manuscript, and, sitting down to read it over again, decided to give it some finishing touches and send it to his publisher. The story which had thus been nearly lost was none other than the famous "Waverley."

"Waverley" was published without the name of the author, and, as it im-

mediately became a popular book, Scott next addressed himself to the writing of the celebrated series known as the Waverley Novels. These wonderful stories, so fresh and vigorous in style and so thrilling in the splendid union of adventure and romance, fascinated the public of his time, and perhaps made his name the more famous because it was at first withheld.

HOW SIR WALTER SCOTT HAD TO FACE DEBTS AMOUNTING TO $650,000

From the sales of his books he earned very large sums of money, far more, and deservedly so, than any author of our time has ever earned, but he unfortunately became a partner in the firm that published his books, and that firm, being stupidly conducted, failed, involving Scott in the general ruin. This happened in the year 1826, only a few months before the death of his wife, who was the daughter of a French aristocrat driven from France to Great Britain during the Revolution.

Sir Walter—for he had been created a baronet in the year 1820—now set himself to the hardest task a great author has ever had to face: no less than to earn by his pen so vast a sum as $650,000, in order to pay the creditors of the publishing firm the money due to them, though he had been in no way responsible for the waste of their money.

Every moment of his time that could be given to his desk he spent there, writing—writing night and day, often with a sad heart and in ill-health, spinning his stories of olden times, perhaps not so brilliantly as he had done before, but writing also many essays, and a "Life of Napoleon."

THE HAND AT THE WINDOW, AND HOW IT SWEPT THE DEBT AWAY

There is a famous story told of Scott in his Edinburgh days. A gentleman who lived opposite his house could see at the novelist's study window a hand regularly placing a newly-finished sheet of writing on the growing heap at the side of a desk. Day after day the unwearied hand was seen; it was Sir Walter's at work on his novels. Long afterwards, at Abbotsford, the same tireless hand was at work, and every time it put down another sheet a little bit of that great pile of debt had been swept away, and so, with the heart of a hero, Scott continued his work for six more years before death overtook him, on September 21, 1832. If he had not succeeded in paying all the money he had undertaken to pay, the work he had done in those six years yielded sufficient after his death to clear off every penny of his debts.

The next great story-teller does not resemble Sir Walter Scott in personal character, although his name is no unworthy one to place alongside of Sir Walter's as a novelist. Lord Lytton, while falling short of Sir Walter Scott in some respects, was a more varied genius, and, indeed, no other literary man of the nineteenth century achieved anything like his success in so many different ways. He could write fine historical novels, such as "The Last Days of Pompeii," and many other kinds of novels as well; he wrote fine plays, such as "The Lady of Lyons," and others which are still performed; while he was also a poet, though not a great one, a brilliant essayist, and a fine orator, gaining some eminence as a statesman and receiving a peerage as a reward for his political services.

LITTLE STORY-LIVES OF LORD LYTTON AND WILLIAM MAKEPEACE THACKERAY

All this will tell you at a glance what a remarkable man he must have been, matching even Sir Walter in his wonderful capacity for work. Before he was made a peer his name was Edward Bulwer-Lytton, and he was born in London, on May 25, 1803. His parents were people of wealth and distinction, so that in early life he had every advantage, but did not greatly distinguish himself at Cambridge, except in winning a gold medal for poetry.

As a little child he had loved to read all sorts of tales of romance, and began writing verse at a tender age, although in after life he won greater distinction in prose than in poetry. It is doubtful whether he was altogether a likeable boy. We know he was no favorite of his father's but that may have been because he was his mother's darling; and at least one of his schoolmasters, Dr. Hooker, of Rottendean, seems to have been glad to get rid of him, while recognizing that he was no ordinary boy. Dr. Hooker wrote to Bulwer's mother: "Your son has exhausted all I can profess to teach him. His energy is extraordinary. He has a vital power which demands a large field. He has it in him to become a very remarkable man."

These were very true words, and were justified in every particular. When Bulwer, against the advice of all his friends, and in opposition to his mother's wish, married a beautiful but unsettled Irish girl, he took, a step which was most disastrous, and few marriages of literary men have been less happy than his.

But his unfortunate marriage had at least one good result, as his mother cut down his allowance to a mere $1,000 a year, while he preferred to live at the rate of $150,000. Thus, in order to secure the necessary money, he took to writing books, and speedily became the most notable literary man of his time, never sparing himself in the work that he had taken up as much out of love for the art as need for the money which it earned him, for in later years, when he did not require to make money by his pen, he remained as thorough and excessively painstaking in everything he did. This great author died at Torquay, on January 18, 1873, and was buried in Westminster Abbey.

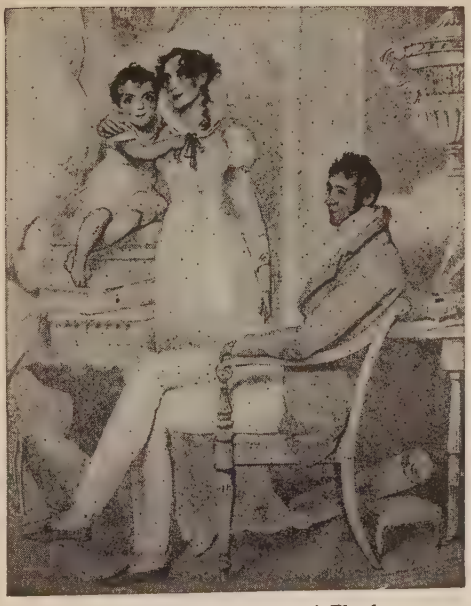
THACKERAY AS A BOY

This bust shows very plainly his broken nose, the result of a blow from a school bully.

Thackeray was born on July 18, 1811, at Calcutta, where his parents and his grandparents before them had lived as officials of the old East India Company, which conducted the affairs of India before it was taken over by the Imperial Government. Then, as now, the children of English people in India were sent home to England, when they became of school age, to be educated in the Old Country. Thackeray's father died when the boy was only five years old, and his mother, who was noted for her beauty, afterwards married again. He was eleven when he was sent to England, and became a scholar at the famous Charterhouse School, in London.

Many great men had been scholars there before him, and as Thackeray was an easy-going, good-natured, and rather dreamy boy, he was probably given to fancying himself as treading in their footsteps instead of applying himself diligently to his studies. Certainly he did not prove a brilliant scholar during the six years he spent there, but he had a great natural gift for writing comic verses and drawing comic sketches, so that he would doubtless prove an entertaining companion to many of the boys by making fun of their teachers—a habit schoolboys have had since schools began. Being inclined to indolence rather than to exertion, he made no figure in the sports of the school, but the broken nose, which is seen in all his portraits, proves that he had at least the pluck to face an opponent, for this was the result of an encounter he had with a fighting scholar when he was only a little boy.

THACKERAY WITH HIS MOTHER AND FATHER



We give this interesting picture of Thackeray as a child with his parents by permission of Messrs. Smith, Elder & Co., who were his publishers. His daughter, Lady Ritchie, now possesses the original painting.

The next two famous story-tellers whose names attract our attention were born within a few months of each other, and we seldom think of the time in which they lived without having both their names in our mind, although there was no great resemblance either between the men or their works. Thackeray and Dickens are to-day the best-remembered novelists of what is termed the Victorian period, their work having been done chiefly under the reign of Queen Victoria, although both of them had begun to write before the death of William IV. William Makepeace

Thackeray did not shine at the University, and he spent only two years at Cambridge, not staying to take his degree; but it was during this time that he made his first appearance in print by writing a very amusing burlesque of the poem with which Alfred Tennyson had just won the prize at the same university. Thackeray had begun to study for the law; but, after leaving the University and spending some time abroad, he decided to become an author, as money could be earned that way more readily than in law, and he had great need of money, which he spent quickly.

Perhaps he would rather have been an artist, and he did study art for a time in Paris; but, although he used his pencil a great deal in after life, and many of his sketches are very amusing, he was never more than an amateur draughtsman. He even applied for the work of illustrating "Pickwick," the famous novel of Charles Dickens, but he could not have done the work so well as the artist to whom it was given.

What fortune Thackeray inherited he managed to lose by taking part in starting newspapers which were failures, and so he was in a manner forced to write for a living. Nor had he any difficulty in getting work to do, as everything he wrote was humorous and full of character. He was twenty-five years of age when he married, and settled in London, but some four years after his marriage the mind of his wife gave way, and all the rest of his life was clouded with this unhappiness, so that when we read his amusing stories we may sometimes think that, though he makes us laugh, his own heart was sad at the time he wrote them. The most famous of the many stories written by Thackeray is "Vanity Fair," which is certainly one of the greatest English novels; but perhaps there is no finer historical story than "Esmond," which he wrote when he was forty years of age. Many of his lighter sketches, in which he pokes fun at all sorts of people of his time, appeared in the great comic paper, "Punch," to which he contributed for many years, and perhaps he wrote so many short pieces because to the end of his days he was rather inclined to procrastinate, putting off his work to the last moment, so that the writing of a long story was a very real task to him; yet none could excel him in the art when he gave his mind to it.

THACKERAY IN LATER LIFE

From a sketch by Sir John E. Millais.

This great writer and very lovable man died suddenly on the morning of Christmas Eve, 1863, and was buried at Kensal Green. A memorial bust was soon afterwards erected to him in Westminster Abbey.

The early days of Charles Dickens were far from being happy, although both his parents were alive to look after him. That is exactly what neither of them did, and although Thackeray had lost his father, and left his mother in India, his boyhood was no doubt happier than that of young Dickens.

Charles Dickens was born at Portsea, on February 7, 1812. His father was a good-natured, lazy man, and his mother a well-educated but not a very warm-hearted woman. Little Charles was taught to read by his mother, but he attended a school at Chatham, where they lived for a time; and the great delight of his early boyhood was the reading of a little library of stories which he discovered in an upstairs room of his father's house. It is said that he would go about for a whole week together imagining himself to be the hero of some of these romances.

His father got into debt; the family moved to a miserable house in Camden Town, London. Charles, who longed to

go to school, was turned into a little household drudge, and his parents seemed to forget about his education entirely.

Later on his father was imprisoned for debt, the bailiffs took away all their furniture, leaving only the beds and some pots and pans, and, worst of all, they took away the story-books which had given so much delight to Charles.

In those days a man who was imprisoned for debt could have his family to live with him in the prison, where a fair amount of liberty was allowed. And so Dickens' mother, with her other children, went to stay at the prison with his father, while he was sent out to work at the distasteful task of sticking labels on blacking-bottles, whereby he could earn a dollar or so a week. At length his father got a legacy of a few hundred dollars, was able to leave his prison, and the family took up house again in Camden Town.

AFTER MUCH MISERY CHARLES DICKENS ENJOYS HAPPY SCHOOLDAYS IN LONDON

When Charles was twelve years of age he was taken away from his dirty work of label-pasting, and sent to a school in Hampstead Road where the teachers seem to have been the queerest sort of people imaginable. But Dickens was happier now than he had ever been; he could indulge in his taste for reading.

For the first time in his life he had chums at school, and as he also loved to imagine himself an actor, he invented what he called a "lingo," which merely consisted in adding a few letters of the same sound to the end of every word, and, talking this aloud, he and his playmates delighted to walk about the streets pretending to be "foreigners."

Charles Dickens was fourteen when he left school and entered a solicitor's office; but on his father becoming a reporter on one of the London papers, the young Charles determined also to be a reporter. So he taught himself shorthand, and by spending much of his time at the British Museum managed to make up for the shortcomings in his education. He was nineteen years old when he became a reporter. While he was working for his newspaper he began writing sketches of the characters he had observed; and in the year 1836 these were collected into a book under the title of "Sketches by Boz," as "Boz" was the name with which he had signed them on their first appearance. He received $750 for this book from the publisher, and when he became famous afterwards he had to pay $8,250 to buy the copyright back from the publishers of the book.

HOW CHARLES DICKENS CAME TO BE LOVED BY HOSTS OF READERS

"The Pickwick Papers" were written a year after "Sketches by Boz," and became so popular that the author was presently the happiest and most successful story-teller in England. To the end of his days he kept the love of the multitude of readers which his stories won to him. He was a true child of genius, and all the hardships of his early life, which brought him into contact with all sorts of people of the lower class, who are always far more interesting than the well-to-do people, he turned into use by weaving them into his stories. His great novel, "David Copperfield," contains much that is true of his own life; and even today Charles Dickens remains one of our best-loved story-tellers, though he died suddenly in the full tide of his splendid literary power on June 9, 1870, at Gads Hill, a fine house near Rochester, which, as a poor boy, he had longed to possess, and had been able to purchase when he became a successful and world-famous author.

CHARLES READE, WHO WROTE THE STORY OF "THE CLOISTER AND THE HEARTH"

A story-writer who was extremely popular in his own day, but cannot be said to have been quite so great as any of those we have mentioned, was Charles Reade. He wrote at least one historical story, which is only second-rate because it has to be compared with the wonderful stories of Sir Walter Scott and Thackeray's splendid "Esmond." This is "The Cloister and the Hearth." Its author was in many ways a very remarkable man. He was born on June 8, 1814, of well-to-do parents.

His early schooldays are said to have been chiefly noted for the amount of flogging he had to suffer, as those were the days when teachers believed more in thrashing their pupils than in making knowledge attractive to them. But he had also private tutors, and later gained some distinction at Oxford University, becoming a barrister in his twenty-ninth

year. A curious fact about Charles Reade is that he is one of the few famous authors who did not begin to write early in life, as he was thirty-six before he seriously attempted the art of authorship, and he was forty-seven when his best story was written.

People who knew him seem to have liked Charles Reade because he was really a very warm-hearted friend of the poor and oppressed, and some of his stories, which were most popular in his own day, were written for the purpose of drawing attention to public evils which he wished to see abolished. He died on April 11, 1884, and was buried in Willesden churchyard.

Anthony Trollope, who was born less than a year after Reade, on April 24, 1815, was the most distinguished member of a literary family. His mother and his elder brother were also well-known authors of their day, though their works are now forgotten.

ANTHONY TROLLOPE, THE MAN WHO COULD WRITE STORIES IN THE TRAIN

Anthony Trollope's own stories are not so often read as they deserve to be. His life is not a very interesting one to write about, as it lacks the ups and downs of fortune which make the lives of many literary men so full of interest.

Trollope was educated at Winchester and Harrow, and became an official of the Post Office, in which service he continued for more than a quarter of a century. His duties took him into many different parts of the country, and sometimes abroad; but he was so methodical a man that he allowed nothing to interfere with the writing of his stories, and resolutely set himself to produce so many pages every day, even if he had to write them in a train. Great literature cannot be created in this fashion, and though method is a good thing in a book-keeper or a carpenter, it is not so in an author who wishes to give to the world the best thoughts he can think and the finest story he can tell, as these come to him only at irregular times.

It is surprising indeed that Trollope wrote so well as he did under the circumstances, for in such novels as "Barchester Towers," "The Three Clerks," "Framley Parsonage," and others that might be mentioned, he gives us really spirited descriptions of the life of his time, which will always be interesting on account of their truth and their correct observation of manners and customs that are now passing away. He died in London, on December 6, 1882.

CHARLES KINGSLEY, A REAL HERO WHO WROTE OF HEROES

A very different type of man, and one whose name must always be remembered with admiration, was Charles Kingsley, the writer of that stirring tale of romance and adventure, "Westward Ho!" He was a very gifted man in many different ways, a true Christian gentleman, a valiant fighter for truth, a distinguished scholar, and the writer of fine, vigorous stories which, in their manly tone and simple, direct manner of telling, resemble the author himself.

The son of a Devonshire clergyman, Kingsley was born on June 12, 1819; and after distinguishing himself at Cambridge University he became rector of Eversley, in Hampshire, in 1844, where the remaining thirty-one years of his busy and useful life were spent. It would be difficult here to explain the great part played by Kingsley in awakening and directing the public mind of his time in all that concerned the religious and social well-being of his beloved England—for in Kingsley we see a fine example of the true-hearted Englishman, and it was in two of his novels, the first that he wrote, "Alton Locke" and "Yeast," that he did immense good in this direction. Such stories as these prove that the art of fiction can do far more in touching the thoughts of the general public than even serious lectures or sermons can do.

KINGSLEY AS A GREAT STORY-TELLER AND SOMETHING BETTER

"Westward Ho," of course, has no such purpose, and perhaps simply because it is a fascinating tale of adventure on the Spanish main in the great days of Queen Elizabeth it is likely to live the longest of all the books he wrote. Kingsley was also a fine poet, but, above all, he was a noble, pure-hearted, and Christ-like man, which, after all, is something better than being even a great story-teller.

He died on January 23, 1875, two years after he had been appointed Canon of Westminster. He was also Chaplain to Queen Victoria. His brother, Henry

Kingsley, who died in 1876, was also a brilliant novelist, and his story of "Ravenshoe" is as good as anything of Charles Kingsley's.

Of course, there are other well-known story-tellers of the nineteenth century whose lives would be interesting to know; but it is impossible here to tell of even the two most famous — George Meredith and Thomas Hardy — and we can only mention another, whose life was in many ways the most interesting of them all.

ANOTHER EDINBURGH BOY WHO BECAME A GREAT STORY-TELLER

Robert Louis Stevenson was born in Edinburgh, on November 13, 1850, and his father, his grandfather, and his uncle were all celebrated builders of lighthouses. Stevenson was very proud of his ancestors, as he might well be, for it is surely a fine work to set up these wonderful towers along the coasts to light the sailors safely home to port through the dark night. It is very likely that the romance connected with the building of these mighty beacons of the sea had much to do in kindling the love of romance in Stevenson himself, which was to result in his writing some of the finest romantic stories published in the latter half of the last century.

Stevenson was a weak and ailing child, and had his parents not been well supplied with money so that they were able to give him the greatest care, taking him to healthful places and constantly watching over him, he might never have grown to manhood. Though feeble in body he was always strong in mind and brave of heart, and he could show when the time came that he could not only write of brave deeds, but that he could do them also.

ROBERT LOUIS STEVENSON AS AN AUTHOR AT SIXTEEN

He resembles Sir Walter Scott in doing nothing of note either at school or university; but while he seemed to be wasting his time he was in reality preparing himself for the work of his life by reading widely all the books we do not get at school and imitating the styles of different authors, until he had formed for himself a manner of expressing his thoughts or telling his tale which is far more charming than that of any other author of his time. He was only sixteen years of age when he wrote a description of a historical event in Scotland, "The Pentland Rising," and this was published as a little booklet.

His first real books were little stories of travel on the Continent, but it was with that most delightful tale of adventure, "Treasure Island," that his name first became popular. He next wrote "Kidnapped," a story that will long be the delight of old and young alike; and he was a charming poet, too, for no one has excelled him in expressing in verse the delights of childhood, as he has done in his famous book, "A Child's Garden of Verses."

Ill-health pursued Stevenson all his days and it is wonderful to think that he was able during his short life, and racked by illness so often, to write so many fine stories, essays, and poems that a complete edition of his works requires no less than twenty-eight volumes, and every page he wrote has a charm all his own, for he never shirked a single sentence.

HOW THE WRITER OF "KIDNAPPED" WAS BURIED ON A SOUTH SEA ISLAND

When he was thirty-nine years of age, he could no longer fight against the severe winters of his native land, and, with his wife and two stepchildren, he built himself a strange house far away in the Pacific Ocean, on the lovely island of Samoa. There for a few years he lived and worked surrounded by native servants, the friend of Samoan chiefs, who loved him as a brother. When he died suddenly, on December 3, 1894, they cut a way through the thick bush and reverently carried his coffin to the top of the beautiful mountain he had loved to look upon from his Samoan home. And there he lies under a tomb on which these verses, written by himself, are engraved:

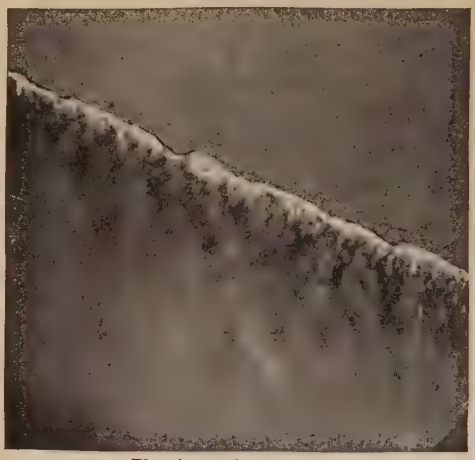
Under the wide and starry sky,
Dig the grave and let me lie.
Glad did I live and gladly die,
And I lay me down with a will.

This be the verse you grave for me:
"Here he lies where he longed to be;
Home is the sailor, home from the sea,
And the hunter home from the hill."

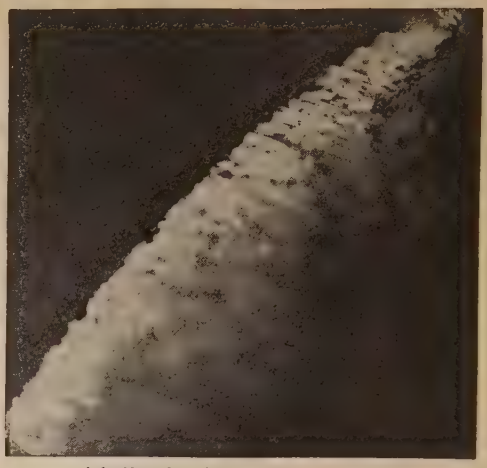
After his death the chiefs forbade the use of guns near the mountain-top where his body rests, so that "the birds may live there undisturbed and raise above his grave the songs he loved so well."

THE NEXT STORIES OF MEN AND WOMEN ARE ON PAGE 2434.

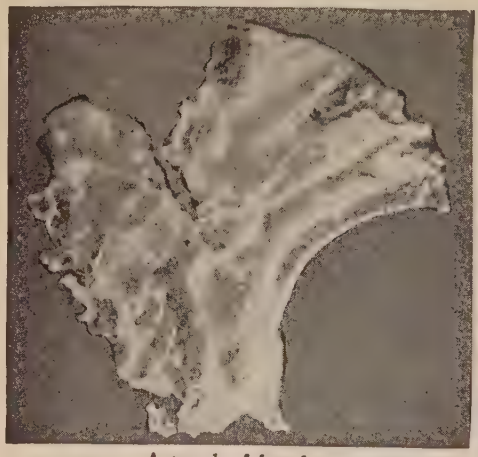
THINGS THAT ARE NOT WHAT THEY SEEM



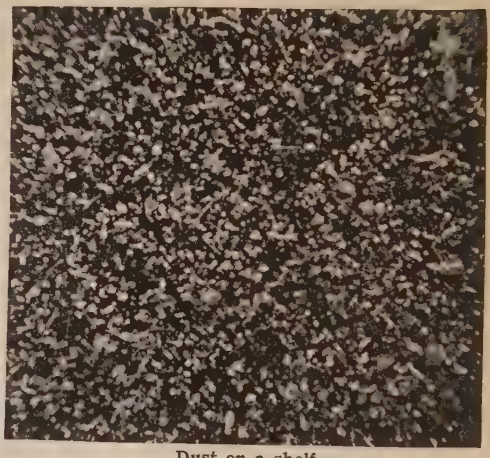
The sharp edge of a razor.



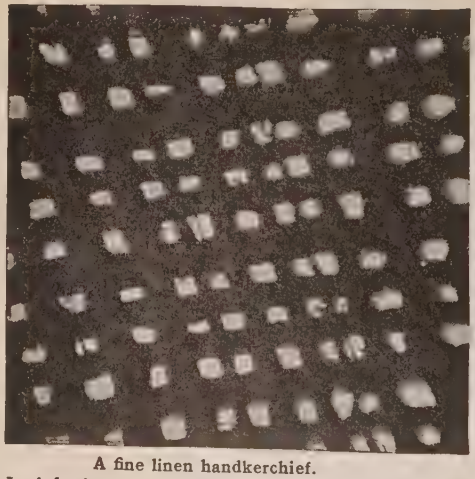
A knife-edge, looking like a mountain.



A crumb of bread.



Dust on a shelf.



A fine linen handkerchief.

The crystals in a pinch of salt.

Look back at the wasp's sting and compare it with the edge of a razor. The sting looks smooth and perfect, when magnified, but the razor, the finest thing the cutler can make, looks jagged and blunt. How much better is Nature's work than man's! The handerchief looks like sacking full of holes, but not black as here.

THE STORY OF THE MICROSCOPE

CONTINUED FROM 2260

HALF the wonders of the world are never seen by human beings. We learn very slowly. It took us millions of years to find out about steam and electricity. The use of gas for lighting was not discovered until years and years after men had seen that it would burn and light dark places. Radium, and the wonderful Röntgen rays which enable us to photograph the inside of the body, were only discovered in the last decade of the last century. Not until Galileo turned his telescope up to the stars had men really seen the heavens and their marvels.

Wonderful as is the telescope, the microscope is to most of us more wonderful still. It does not make distant objects seem near. The object to be examined has to be placed quite close to the glass of the microscope, but it makes those objects seem so large that there are few secrets of Nature which we cannot examine.

For thousands of years men were on the way towards making the grand discovery of the microscope, but they stopped short of full success. When Sir Henry Layard was digging in the rubbish which covered the great palace in which Nimrod once lived, he found, in the ruins, a lens of rock crystal—that is, a lens of natural glass—which had been used as a magnifying glass when Nimrod lived, thousands of years ago.

How could they have discovered the use of the magnifying glass all those ages ago? Probably it was because they learned that if a tiny object, placed on a flat surface, were covered by a drop of clear water, the little object would be made to appear large. They would not understand that a transparent object which has its surface arched outward, like an egg, alters the direction of the rays of light traveling through it. This alteration of the direction of the ray is called refraction. The effect of this is to gather together the rays of light coming from all quarters, to focus them on the object under the lens, and to make that object appear as a very large, clear picture to the eye. The ancients perhaps found that glass, shaped like a drop of water, would do the same thing.

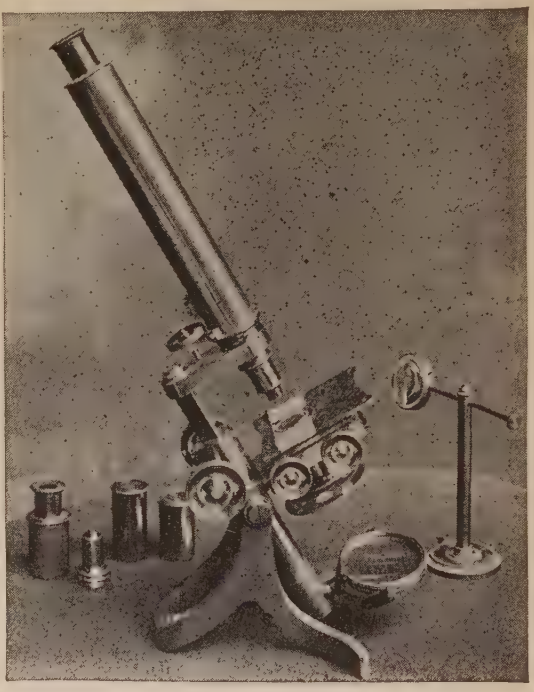
At different times in history other men made just the same sort of discovery. Men made magnifying glasses by melting many threads of glass together into bubbles, and by blowing glass balls and filling them with water. Polished gems also were used for this purpose. The word *lens* tells us what men thought of the things they used. They called the glass a lens because it reminded them of the shape of a lentil seed. Spectacles are one of the forms of these glasses for making things appear

larger and nearer. Those have been in use about six hundred years.

One of the first men who really studied microscopes was Anton van Leeuwenhoek, a poor Dutch clerk, who was born in 1632 and lived till 1723. He ground and polished lenses which magnified things he looked at. His work was very important. In 1628 Harvey had given the world his explanation of the circulation of the blood in our bodies. That was the greatest discovery ever made by a surgeon up to that time, but scarcely anybody knew what it meant and many people did not believe it. But Leeuwenhoek, with his microscope, was able to examine the blood in the veins and actually to see it flowing along. He also described accurately the red corpuscles of the blood. Harvey would have given all he possessed to see that sight, but he was in his grave before Leeuwenhoek made his microscope. Although Leeuwenhoek did so much wonderful work, he could not go beyond the powers of the microscope he made. It remained for other men, like Dr. Wollaston and Sir David Brewster, to make big improvements. They had great trouble with the lenses, so much so that Brewster said that we should have to use diamonds for the lenses. What was sought in the way of improvement was to increase the power of the microscope to magnify and to make the object examined clear and sharp as well as large, and with its colors preserved, not all jumbled together.

Many men have helped to do this. Two of the most famous are Giovanni Battesta Amici, an Italian astronomer, and the father of Lord Lister, Joseph Jackson Lister. The last named suffered from short sight in one eye. Now, when he sat at the window looking through an air-bubble formed in the glass, he saw that the bubble made the things beyond the window clear to his short-sighted eye. This set him thinking about the use of lenses for the eyes. But he had to work hard, and it was not until 1824, when he was nearly forty years old, that he had time to experiment with the microscope.

He employed a man to make lenses for him, but soon Lister had to take up the work himself and to make his own. He discovered that previous ways of making and arranging the lenses had been wrong. He made new lenses and arranged them in a different way. Many improvements have been made since then, but he paved the way to make the microscope the thing of wonder that it is to-day.



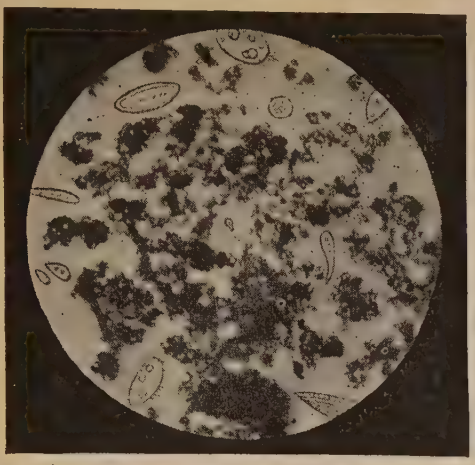
THE MICROSCOPE

Placing the object on the plate or shelf of the microscope, we look at it through the tube, which has the lens at the top, and a smaller glass, like a big diamond, at the bottom. The round glass under the plate reflects light through the plate. The glass like a bull's eye reflects light from the gas or lamp.

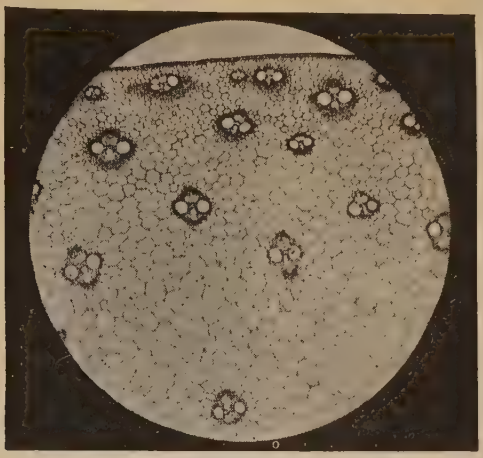
By its aid we can see a world of living things in a drop of pond water; we can make a grain of sand look like a great crystal with the light shining through it. We can see living animals in the human blood fighting out their battles before our eyes. We can see a tiny piece of rose petal becoming a marvelous web of silver cells, all filled with fluid; we can see a claw like the claw of a lion on the foot of a caterpillar.

The microscope reveals to us wonders that Shakespeare never saw; marvels that the greatest kings of the past could not have seen, had they offered their crowns to see them. The pictures in these pages show us some familiar things as seen through the microscope.

FAMILIAR THINGS UNDER THE MICROSCOPE



A drop of water seen through the microscope



The stem of a maize plant cut through

A section cut through a fern

A white daisy petal

A peep inside a lime-tree twig

Thistle-down

The stings of a nettle

The tiny drop of water here is magnified to 100 times the size which it seems to our eyes. It is pond water and is full of living things, swimming, eating, and drinking before our eyes. No wonder the nettle hurts when it has such stings! How beautiful is the inside of the lime twig when magnified, like some fine mosaic.

WASPS, BEETLES, SPIDERS, AND LADYBIRDS

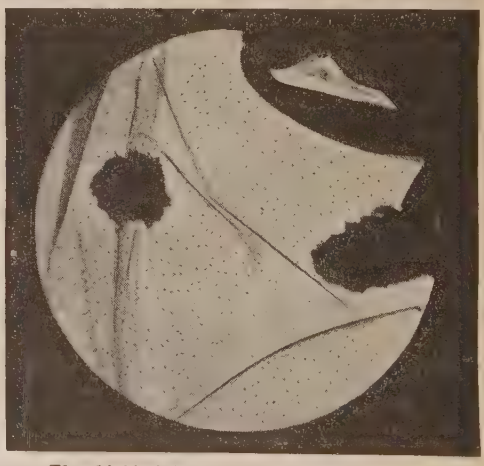
The strong leg and claw of a water-beetle

The keen spear with which a wasp stings us

The head and jaws of a ladybird

A spider's thread, and the spinnerets from which its web comes

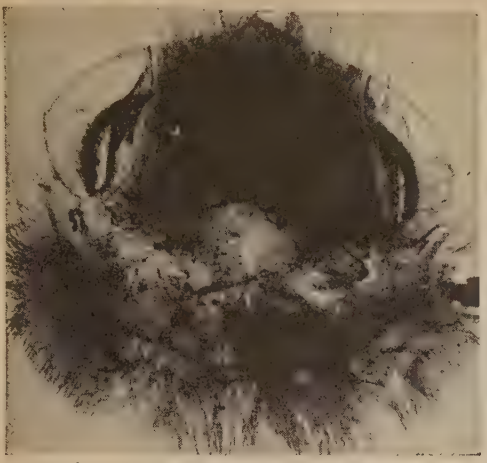
A small portion of the ladybird's wing



The shield of the ladybird, showing the spots.

It is quite startling to look at insects through the microscope. They have weapons of which we never dreamed, and seem so big and powerful that at first the sight of them makes us shudder. Look at the water-beetle's claw, it is like a crab's claw. The neat little ladybird's head looks like the picture of a demon.

THE WONDER OF HAIR, FEATHERS, & WINGS



A moth's head many times magnified

The hair of a guinea-pig

Part of a fly's wonderfully-made wing

The wing of a gnat

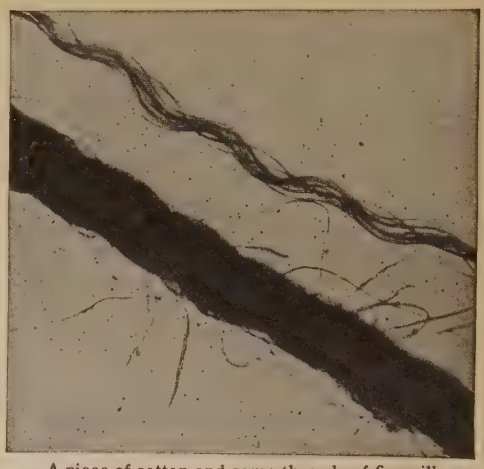
The downy end of a small feather

The small end of a chicken feather

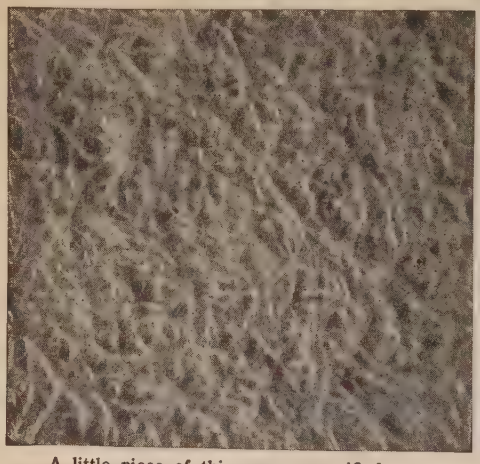
The heads of moths and flies do not always photograph well because it is difficult to get the right light on them. The wings of insects, however, are easy to photograph. A gnat's wing is wonderful; it looks like the transparent ear of a big stag. A fly's wing looks, under the microscope, like a wonderful raft.

LITTLE THINGS AS THEY REALLY ARE

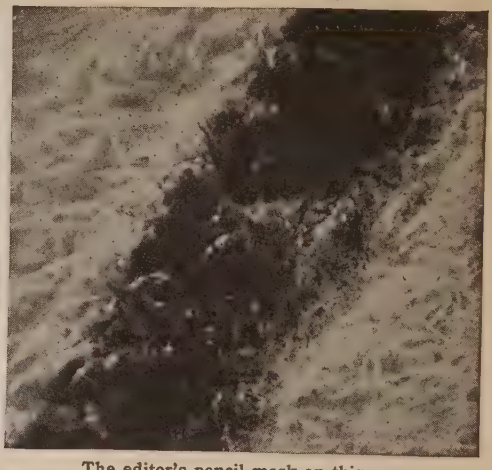
The eye of a needle and the point of a pin



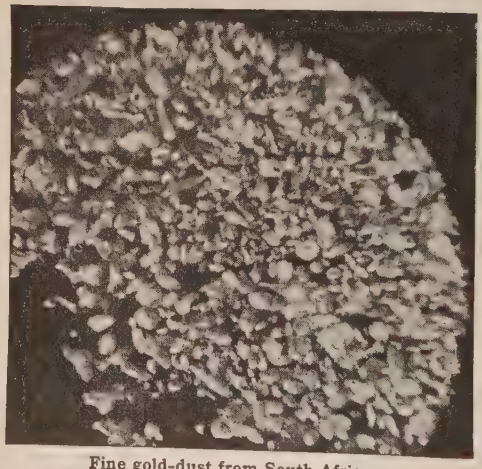
A piece of cotton and some threads of fine silk



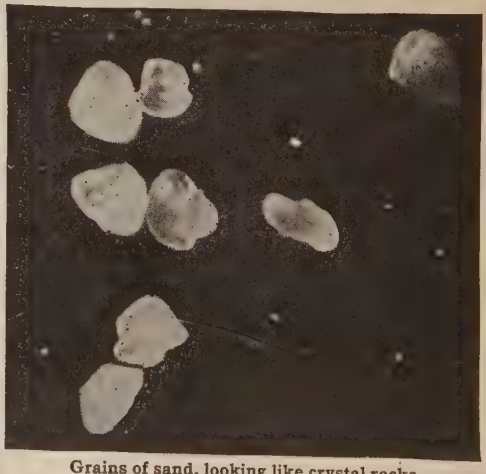
A little piece of this paper magnified



The editor's pencil-mark on this paper



Fine gold-dust from South Africa



Grains of sand, looking like crystal rocks

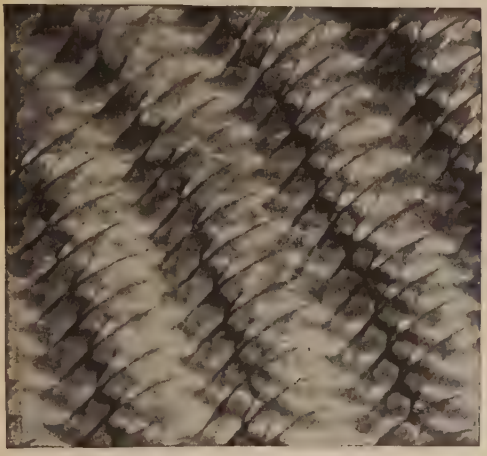
The microscope makes the needle look like a rail with a hole through it and the pin-point like a poker. The pencil-mark on the paper was lightly drawn, but here it looks like a great volcano on the moon.

THE MARVELS OF TINY LIVING THINGS

The eye of the hive-bee

The feeler by which a moth feels and hears

The leg of a spider



The roof of a shell-fish's mouth

The teeth of a snail, each tooth like a file

Coiled tongue of a butterfly

The wing-cases or "pincers" of an earwig

Tongue of the house-fly

We could make these objects larger by using a more powerful lens, but if we want to see much of the object at the same time we use a rather weak lens. We could look at a small portion of the spider's claw and make it seem like a lion's claw; and see right through the tongue of the butterfly and the pincers of the earwig.

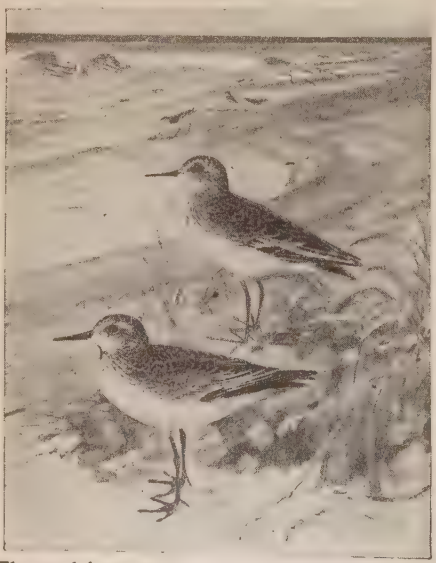
THE NEXT FAMILIAR THINGS BEGIN ON PAGE 2427.

WATER BIRDS OF THE SOUTH

The wood duck is the most beautiful of the whole family. It builds its nest high up in a hollow tree, sometimes quite a distance from the water.

The noddy is a tern, with the top of its head silvery white and the remainder of its plumage dark brown. It nests in shrubs or low trees.

The story of the egret is a shameful one. Formerly thousands were killed for their feathers and the young left to starve. Through the influence of the Audubon Society, they are now protected and guarded, and are increasing in numbers. This egret is sitting on its rough nest of twigs.



The sandpipers are common in the North but are seen in the South chiefly as they are migrating northward. They are attractive and cheerful.

The brown pelican shown here at its nest belongs to the West Indies and the South Atlantic States. It is hunted for the feathers of its wings.

SNOWY EGRETS OVER THEIR NEST

The colored plates in this article are printed by special permission of the United States Department of Agriculture, for which the birds were drawn.

INTERESTING AMERICAN BIRDS

CONTINUED FROM 2221

THE birds of North America, like those of all other continents, are not uniformly spread in their residence, or migrations; that is to say, you cannot find the same list of birds in one part of a continent that you do in another, except in the case of a very few kinds. This is owing to several causes, the chief of which is climate and its effect on bird-food. It is evident that birds that are accustomed to get their food altogether from the ocean cannot live inland; and that those subsisting on fish, frogs, and aquatic animals and plants will not be present on the dry interior plains and prairies, or among mountains, where lakes, large rivers, and marshes do not exist. On the other hand, the seed-eating sparrows of the plains, the thrushes, finches, woodpeckers and so forth that depend on insects that throng where trees and plants grow thickly, have no reason to go to the seashore.

In addition to this the birds (and other animals) of the Pacific side of the continent are different, on the whole, from those of the Atlantic slope; and those of the Mississippi Valley differ to a great extent from both. The snowy ranges of the Sierra Nevada and the Rocky Mountains are too high for most of the Pacific birds to cross; and the wide, dry, treeless plains prevent a large number of the birds of the eastern half of the country from ranging much westward of the Mississippi River, although the more wooded and well-watered character of northwestern Canada enables eastern birds to extend their range much farther west there than in the United States. Such things as these influence the range of birds.

Birds of the North and Birds of the South

But there is another sort of distribution. Some birds are accustomed to go even to the Arctic regions to spend the summer and rear their young; others are able, or choose, to go only to the northern border of the United States, or may remain there all the year round, because they find in the northern half of the continent water and food that suit them. These are seen in the southern half of the Union only when passing through it to and from their winter home in the tropics; and in winter various Arctic birds come south only as far as the northern tier of the states. If you will draw a curved line on a map from Boston through Buffalo, Cleveland, Chicago, and northwestward to and along the upper Missouri River, you will define about the southern boundary of this northern "province;" and its birds have been described in other volumes

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of THE BOOK OF KNOWLEDGE under the title of "Birds of Canada."

But a great number of the birds either live all the year round south of this line, or when they come north in summer do not extend their northward migration beyond the central United States; and a good many of them are not to be found at any season north of the Carolinas on the coast, or Tennessee and Oklahoma in the west. Similarly on the Pacific coast southern California and Arizona have birds never seen north of the hot, dry district.

WHY ARE BIRDS DIFFERENT IN DIFFERENT STATES

The only explanation of these variations in geographical distribution is that the variety of climate and food make conditions in one region suitable for certain kinds of birds and not suitable for others; and each species inhabits that district or "zone" where it thrives best. As for those of the Southern States, to be described in this article, most of them belong to families the greater number of members of which belong to the tropics, so that it would appear that such species are an adventurous overflow northward of these families. Most of them migrate to spend the winter in Mexico and Central America. Their absence is somewhat compensated for by the inflow of northern birds, which are satisfied with the winter temperature and freedom from snow of the Gulf States, so that this region has more birds all the year round than any other part of the United States. This is owing to the fact that birds may find food there when northern states are under a pall of snow, ice and cold winds.

Beginning with the water-birds, it may be said that most of the sea-fowl and the ducks pass on in spring to northern breeding-places, so that only the laughing-gull, with the slate-colored head, and a few terns, represent in the South the great gull family. The large, crested Caspian tern, the smaller but similar royal tern, and several other rarer ones make their nests among the pebbles of the sandy islands along the coast. All these sea-swallows are dressed in white and pearl-gray with black caps. Two or three kinds of dark-colored terns are also present, one of which, the noddy, reverses the usual coloring, for the top of its head is silvery white, and the rest of the plumage dark brown. It differs from the others, all of which lay four heavily blotched eggs with little or no nest, by making a rude nest in bushes and low trees, and laying whitish eggs. Great colonies of noddies inhabit the Tortugas Islands. A relative of these is the black skimmer, a tern-like bird with a very long straight beak, the lower part (mandible) of which is longer than the upper. The bird flies close to the water, with this long under lip cutting the surface, and so scoops up any little fish it can catch.

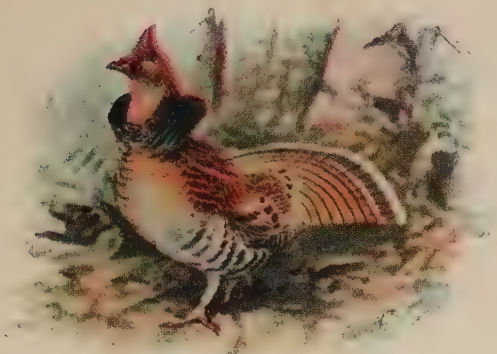
Along the coast of the Gulf of Mexico are to be seen every year a few tropic-birds, boobies, darters, cormorants and man-o'-war birds, elsewhere described; and great numbers of brown pelicans. These last are resident in Florida, and are protected by law on certain islands in Indian River, and on the west coast; otherwise they would doubtless all have been killed or driven away by tourists or by men who want their great wing-feathers for millinery.

THE MOST BEAUTIFUL AMERICAN DUCK

Of the few ducks the only one that needs mention is the wood duck — the most beautiful of all our ducks, and known in summer all over the United States wherever woods and waters lie together. The female is streaked brown, but the drake wears a splendid dress. His head is rich, glistening green, the feathers prolonged backward into a pointed crest. A white line runs on each side from the red base of the bill over the eye to the tip of the crest, and other white lines diversify the checks. The back and tail are dark green, the breast chestnut, the flanks buff, and the under part of the body white; and these blocks of color are separated by lines and touches of white.

This lovely duck has another very interesting characteristic, for it makes its nest, not beside some marshy lake or stream, as do the mallard, the black duck and others, but in a hollow of a broken tree or dead stub. This may be sixty feet or more above the ground, and sometimes it is a mile or more from any water, so that one wonders how the ducklings are to be got down and given an opportunity to learn to swim. The drake leaves that to the mother, and she manages it in several ways. Sometimes the little ducklings, soon after they are born, are

SOME OF THE MOST INTERESTING AMERICAN BIRDS

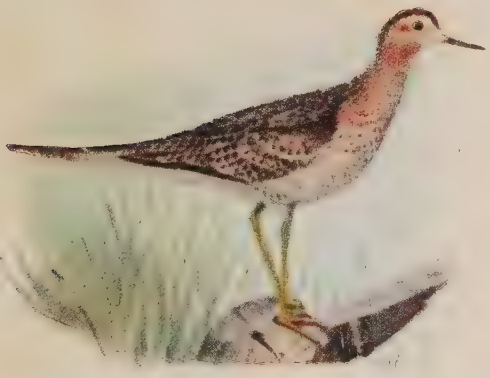


RUFFED GROUSE

BLUE JAY

MOCKING BIRD

QUAIL, OR BOBWHITE



UPLAND PLOVER

CALIFORNIA JAY

Here are some common birds of the fields and woods. The ruffed grouse and the quail are game birds, and the mocking bird is one of our sweetest singers. The jays are noisy and quarrelsome. The upland plover is really a sandpiper.

just pushed out of the doorway of their home and float down without harm like balls of down; and sometimes they are carried down, one by one on their mother's back; but usually she lifts them in her bill by a wing or leg and carries them to safety. If water is near by they go into it at once, but frequently have to scramble a long way to reach it.

Birds killed for their beautiful feathers

Many kinds of wading-birds are residents of the South, where the extensive swamps and marshes along the Gulf coast, and the lower reaches of the Mississippi afford them the food and nesting-places they like. They are mostly of the heron tribe. Remarkable for their beautiful rose-red plumage, the flamingos and the roseate spoonbill are now very rarely seen although formerly common; and the same is largely true of the egret, or white heron, its lesser cousin, the snowy egret, and the fine glossy ibis.

The present scarcity of all five of these most beautiful of water-birds is owing to their having been killed, ruthlessly and incessantly until recent years, for the sake of their exquisite plumage. That any remain is to the credit of the National Association of Audubon Societies, which not only has obtained protective laws from state legislatures, but has paid for guarding the birds while rearing their young, when only the coveted plumes are to be obtained from the parent-birds, thus entailing the death of the forsaken young.

Among the other herons, the great white and the great blue, each standing three feet and a half high, the Louisiana, the little blue, the little green, and two night-herons are still common in that region. All feed on fish, frogs, snakes, crayfish and similar creatures found in the marshes, and build rude nests of sticks in trees and bushes growing in or near water. Sometimes hundreds of these nests are crowded together in a great company called a rookery. Some of these species, as the blue herons and the night-herons, are also found elsewhere in the United States.

Marshes, not only along the southern coast, but all over the interior as far north as the Great Lakes, are inhabited by various bitterns and marsh-hens or mud-hens, known in the books as gallinules, rails and coots. These are plump, brownish or purplish birds, varying in size from that of a chicken to that of a partridge. They are good swimmers as well as runners, and feed on insects and small animals. Most of them are good eating, and one, the little sora, is a favorite table-bird in the South. In such places, too, you will find the bittern — a long-necked, long-billed, streaked bird, that has the habit, when alarmed, of stiffening its body into an upright attitude, with its beak pointing straight up. Then its stripes blend with the light and dark lines of the reeds about it, and it can scarcely be seen. The bittern is the bird that makes the loud booming we hear in the marshes at dusk, and among its many names are "stake-driver," and "dunk-a-doo."

Shore-birds — sandpipers, stilts, oyster-catchers, plovers, curlews, and their like — are noticeable in the southern and central United States mainly during their spring migrations, when they alight on our shores after a night spent in crossing the sea from the West Indies or Venezuela, and for a few days haunt the beaches and wet lands, then pass on to summer residences in the far North.

Some game birds which are left

A few, however, remain with us and are well-known to gunners. The largest of these is the woodcock, which is nearly the size of the bobwhite and dwells in wet woods. It is mottled brown with broad blackish bars across its head, neck and back, and flies with a startling *whirr* when you come near it. Like the snipes, it probes in soft earth and sand with a sensitive bill, which feels the earthworms and buried grubs that it seeks; and it feeds mainly at night, resting by day in some shadowy recess, where its nest and white eggs are half hidden among fallen leaves.

The snipe is much smaller, and dwells in wet lowlands where in the autumn it, and many other kinds of shore-birds, are sought by gunners aided by trained dogs. On the higher, dryer grounds are to be found the Bartramian sandpiper, usually miscalled "upland plover," and certain true plovers. The plovers are birds somewhat bigger than a robin, with rather long legs, and bills that resemble those of a pigeon; most of them are black and white, with touches of brown, and with a dark ring about the neck. The most familiar are the golden plover, known all

over the world, and the killdee, whose noisy yelling is to be heard in all open country, where its eggs are likely to be found on the ground in cultivated fields as well as in wild uplands.

This brings us to the family of game birds, including the bobwhite or "quail," the ruffed grouse and the prairie chicken, descriptions of which will be found elsewhere. The only one of the group that is distinctively southern is the turkey.

WHERE OUR DOMESTIC TURKEY CAME FROM

Our wild turkey, which, before white men and their guns came to this continent, were found in Ontario and all over the eastern United States, is the same as the Mexican turkey; and there is a second species in Yucatan. It was found by the Spanish conquerors of Mexico, early in the 16th century, domesticated among the Indians, and living specimens were sent back to Spain, and soon became domesticated there and elsewhere in Europe. The people had a vague idea as to where this new fowl came from — some thought from Turkey, others from India. In France, therefore, it is still called *l'Inde*, but in England it was known as Turkey-bird. The British colonists in New England imported it under this name with their chickens and cows; and in this roundabout way our barnyard turkeys got back to their native soil, very little changed from their wild brethren, which are now rare except in thinly settled parts of the Southwestern States.

Another bird that formerly was to be seen in the central part of the country in enormous numbers every summer was the "wild" or "passenger" pigeon. It is now extinct; and its story is so well known that it need not be repeated here.

Another smaller pigeon, the Carolina, or turtle, or mourning dove, as it is variously called, is still common all over the country, and especially in the South, where in winter vast numbers gather to pass the cold months, and in some states are regarded as game birds. This dove is smaller than the domestic pigeon, and utters a plaintive, moaning note, constantly heard in the woods in early summer. It nests not only in low trees, but on rocks, stumps, and logs, or even on the ground in the prairie regions; and lays two eggs on a very rude little platform of twigs.

Next come the birds of prey, few of which call for notice, because most of them are northern birds, and have been pictured in other chapters, as may be found by consulting the Index. Two vultures, the turkey-buzzard and the carrion-crow, are peculiar to the South, although examples are to be seen now and then all over the country. Both are black throughout and have the head and neck naked of feathers; but in the turkey-buzzard the bare head is red, and in the carrion-crow this part is blackish. They feed almost altogether on carrion, and in far southern towns are protected as scavengers, throng about the streets and buildings, and range over the farm fields. Both, although so disgusting when seen near by gorging themselves on offal, or devouring some dead animal, are beautiful in flight. "On outstretched, immovable wings they soar overhead in graceful circles, perfect pictures of 'repose in motion.' Without once flapping their broad pinions, they sail in spirals up the sky until they are hidden by the storm-clouds they have purposely avoided."

SOME HAWKS AND OWLS WHICH WE KNOW

The long-winged, light-colored hawks called kites are common in the South, also, where they glide over the marshes in search of snakes, frogs, and insects on which they feed. The swallow-tailed kite is the one most often seen, and is perhaps the most graceful of all our birds of prey. The fish-hawk, and its tyrannical associate, the bald eagle, are common there, but the golden eagle is unknown, except toward Mexico. Many of the northern hawks and falcons spend their winters on the southern coasts.

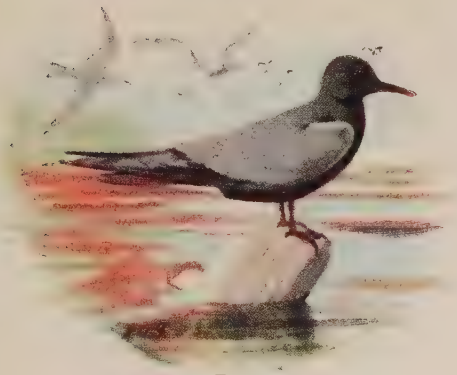
Much the same may be said of the owls. The little screech-owl, the barn-owl, the great-horned, and the barred owls belong to the Southern as well as to the Northern States, but most of the species breed only in the North. One, however, calls for a brief description, the queer little burrowing owl; which may be found from Florida to southern California, and all over the plains and mountain valleys from Nebraska to Utah and southward to Panama.

It is only ten inches long, and is buffy, dotted with white, so that it has the general color of the half-bare ground where it lives; and it stands very upright on rather long yellow legs, and does much running about but little flying. It rarely

MORE INTERESTING BIRDS OF SEA AND LAND

Myrtle Warbler

Screech Owl



Black Tern

Bobolink

Rose-breasted Grosbeak

Kildeer

The myrtle warbler loves the berries of the myrtle. The bobolink is a cheery songster, and is also eaten for food. The rose-breasted grosbeak is the most beautiful of the family. The screech owl is harmless.

if ever alights on trees, and lays its white eggs in a nest made in a burrow. Often the burrows of these owls are dug by themselves; but they are glad to find one made by some other animal in which they may make a residence with little trouble in preparation. Therefore, these owls are always common in prairie-dog colonies, not only because they find there many empty holes and burrows suitable to their need, but because these "towns" furnish them with plentiful food; but the old story that they dwell comfortably in the same burrows with the prairie-dogs and rattlesnakes is nonsense. If the owl enters the hole of this or any other ground-squirrel it is to hunt for, and seize, the young ones, and if it had a fair chance it could doubtless kill any snake it met on the same errand. This owl is strong and courageous despite its small size, and catches and eats all sorts of ground-squirrels, rats, mice, shrews and other small mammals, besides insects, snakes and an occasional bird. Those in the Northwest migrate to warmer regions on the approach of winter.

We have now come to the long list of birds of woodland and field, which please us by their elegant form and color, delight us by their singing, amuse us by pretty ways, and, best of all, serve us by aiding in our constant fight against insects that devour our crops, injure our trees and threaten our health. These birds are nowhere more numerous and useful than in the central and southern parts of the United States; but the space allowed to this chapter will permit an account of only that few of them that are peculiarly southern.

A BIRD WHICH CAN OUTRUN A SNAKE

The almost tropical character of the Gulf Coast is shown by the presence there as annual stragglers of several birds whose proper home, as a species, is in the West Indies or Mexico. Such are the mangrove cuckoo, the coal-black anis, "tick-birds," or "jew-birds," which build community nests, and the famous "road-runner" of Arizona and southern California. This is a queer kind of ground-dwelling cuckoo, which can outrun a good horse, and catches for food swift lizards, agile snakes and jumping grasshoppers. It makes a big thorny nest in cactus plants, and feeds its young on lizards. The gorgeous green-and-red tropical trogons are represented by one sort, the coppery-tailed trogon, that crosses the Mexican border into Arizona. In body it is somewhat larger than a robin, but has a crested head and a tail longer than its body. Trogons have the habits of flycatchers, live mainly on insects, but also eat fruit, and make their nests in holes in trees in the mountain-woods. The Mexicans call them "widows," on account of their peculiar crying notes.

The large woodpecker tribe has been pretty well described elsewhere, but some species are never seen in the Northern States. Chief of these southern woodpeckers is the great ivory-bill, now very scarce except in such great swamps as that about Lake Okeechobee. It is good to know that they are carefully guarded and are increasing on Avery Island, in Louisiana, under the protection of the owner, Mr. H. E. McIlhenny, who has formed his great estate into a bird-refuge.

This magnificent woodpecker measures 20 inches in length, and has a chisel-shaped bill truly ivory-like in appearance, 2¾ inches long. It is black with a white stripe running from the mouth down the side of the neck and over the shoulders, and the wing-quills are white; and its head is crowned by a high, sharp, scarlet crest.

Other special southern woodpeckers are the red-cockaded, which has a red tuft on each side of the head; the red-billed, which is barred with alternate lines across the back and wings, and has a red cap and red beneath the tail; and the similar Gila woodpecker of Arizona, with a gray head broken by a red patch on the crown.

SOME QUEER BIRDS OF THE NIGHT

We are familiar in the North with the whip-poor-will, the eastern nighthawk, or "bullbat," and with several similar species of the nightjar family on the Pacific slope; but one sort is restricted to the South. This is the noisy nightjar called from its cry chuck-will's-widow. It is, indeed, just a big nighthawk, browner and with more bristles about the great mouth, which opens to trap and swallow the largest moths as well as flying beetles and lesser insects. Like its relatives, it hides away by day on some perch in a shady dell, or at the edge of the woods, and attracts notice in its mottled brownish coat, which is very

beautiful when looked at closely; and at dusk it begins its powerful flight in search of food to be caught on the wing, darting up and down, here and there with astonishing agility. Now and then it captures and devours small birds. It is at such hours, and all through the night in the breeding season, that the loud calling of these birds one to another echoes through the air, often disturbing our sleep. The eggs of this species, like those of the other nightjars, are laid on the bare ground, or in the Southwest often on the roofs of the flat-topped farm-houses, with no nest whatever; and they are only two, and very darkly blotched.

Passing over the swifts we come in regular order to the humming-birds, where we need not linger except to say that besides the familiar ruby-throat of the whole eastern region, all other species are confined to the region west of the Plains, and mainly to the coast of California and northward. To the next family, the flycatchers, however, we must pay some attention.

THE SCISSOR-TAILED FLYCATCHER

THE SCISSOR-TAILED FLYCATCHER

The most beautiful North American bird of this family is southern—the scissor-tailed or swallow-tailed flycatcher of Texas and Oklahoma. It is a small bird, nearly white in general appearance, with two tail-feathers as long as its body. These long outer tail-plumes, which it can open and close at will, and its rose-pink flanks, make the bird as conspicuous as it is beautiful, as it restlessly moves about, with extremely graceful movements; or perhaps, as is its habit at twilight, it will rise high in the air, and then flutter down in zigzag flight, waving and twisting its beautiful plumes as it falls through the evening air. It spends most of its time in open places, where it can see, dash after, and seize the flying insects on which it subsists; but it builds a deep, downy nest in some woodland tree, and lays cream-colored eggs prettily spotted.

The eastern and western kingbirds are widely distributed and well-known, and two or three additional species of similar habits come a little way over the border from Mexico, one of which, the gray kingbird, is a summer resident in Florida or along the Gulf coast, where its sharp cry, *pitirri, pitirri*, rather than its appearance, distinguishes it from its northern cousins.

The phoebe and other pewees are to be seen all over the country, though nesting mainly in the Northern States and Canada; and the handsome, vigorous loud-whistling, brown-and-yellow, crested flycatcher, which likes to weave an old snake-skin into its nest in some hole in a dead tree, is as well known in the South as elsewhere.

The same may be said of the blue-jay, so familiar in Dixie-land as "jay-bird" and the hero of so many songs and legends among the colored folks there; but Florida has a different, more brownish species of its own. In the Southwest, too, are several all-blue jays, and one green species, but the noisy, blustering, swashbuckler manners of all are much alike. Our crow lives and nests all over the South, but that region, all along the coast, has also the smaller fish-crow, not known north of the lower Hudson valley, which subsists mainly on what it can pick up along the beaches and river-banks, and is a mischievous robber of birds' nests in the spring.

SONGBIRDS WHICH ARE KILLED FOR FOOD

This brings us to the large family of orioles and blackbirds, most of which have been elsewhere described (see Index). The meadow-lark is known in the South as "old-field-lark," and in winter

is so numerous there that it is shot as a game bird. The bobolink is known there as "rice-bird" when in the spring, on its way north, it, with the red-winged blackbirds, attack the rice-crops in vast flocks; and in the fall it is shot and trapped for market in great numbers as the "reed-bird." Of the grackles, or "crow-blackbirds," the great boat-tailed species is peculiarly southern, nesting in colonies wherever swamps attract it all along the coast and large river-courses from Carolina to Texas.

Now we come to the extensive and widely distributed family *Fringillidae*, which includes the sparrows, buntings, finches, and grosbeaks. "They present," says Chapman, "wide diversity of form and habit, but generally agree in possessing stout, conical bills, which are admirably adapted to crush seeds. They are thus chief among seed-eaters, and for this reason are not so migratory as insect-eating species. It is only of late years that their great economic value as the destroyers of weed-seeds has been recognized." Of this long list of streaked, ground-keeping sparrows we need not speak, for all our space is needed for certain brightly plumaged grosbeaks and finches that are exclusively, or especially, southern in their range.

The brilliant cardinals and tanagers

The largest and most widely known of these is the red bird, or Cardinal grosbeak, which remains in the South all the year round. It is among the largest of its race, as big as a robin, but stouter in build, and is dressed in cardinal red, set off by a bold crest and a black ring about the base of the strong, coral-red beak. It comes familiarly about plantations, villages, and city parks, cheering everybody by its joyous whistling, and lighting up the foliage with its gay color; and in the dull days of winter it seems gayer still by contrast with the dull landscape. No wonder that the redbird is a universal favorite, and that many stories gather about it.

The cardinal is often confused with the tanagers by those who do not know the birds very well. The tanager represents an allied family of brilliant plumage very numerous in the tropics, of which we have two species—the scarlet tanager and the summer tanager. The former visits all the eastern United States in summer, and the male is dressed in scarlet, with jet-black wings and tail; but the summer tanager is rose-red, with dusky wings, and is rarely seen north of Carolina and the Ohio River. Both birds are fond of forests, and the latter is especially a denizen of pine woods. "High among the tree-tops of the cool green woods," writes Florence Merriam, "the tanager sings through the summer days. Hidden by the network of leaves above us, we often pass him by; but once discovered he seems to illuminate the woods. We marvel at his color. He is like a bird-of-paradise in our northern landscape." The call of the scarlet tanager is a loud, distinct *chip chur-r-r*, while the summer tanager says *chicky-tucky-tuck;* but both have excellent songs while their mates, which are safely dressed in greenish-brown, brood their eggs on their nests in the trees.

Birds which dress in blue and purple

The overflow from the tropical *Fringillidae* has given to the warm South several blue birds of exquisite plumage. One of these is the blue grosbeak, a large finch dressed in dark purplish blue and black, that is not very conspicuous either in appearance or song. Much better known and more interesting is the indigo bird, which is not only southern, but is a delightful summer visitor to all the Northern States as well, where its sparkling music is heard even in late summer when most other birds have ceased to sing. The coat of this little singer is pure purplish blue, with changing tints as the light strikes it; but his wife, at rest in her snug nest in the bush beneath his perch, is dressed in soft browns and drabs, as is the case with almost all birds the males of which are brilliantly arrayed. Were the females and young as brilliant as their mates it would be hard for them to hide either themselves or their nests.

Similar to the indigo bird in size, habits, and song is the lazuli bunting of Texas and the Pacific coast; but only the head, throat and back are blue. The lower surface is pure white, separated from the light blue of the throat by a cinnamon band across the breast. Along the Mexican border we have in summer the varied bunting, whose coat is patterned in a mixture of red, purple, and blue hard to describe; it is uncommon.

This introduces the painted bunting, or "nonpareil," as it was admiringly named by the French people of Louisiana long ago. The head is dark blue, the back and fore part of the wings are golden-green, the wing-quills, rump, and tail dull red, and the throat and whole lower surface bright red. This is the male. The female is olive green above and greenish white below. This elegant finch is more often heard than seen, for it is fond of dense thickets, where it slyly hides as if afraid its shinning costume would betray it. It is to be found in summer from North Carolina to Texas, and northward to Arkansas, and formerly many were caught and sold as cage-birds.

THE TUFTED TITMOUSE

THE GREAT FAMILY OF WARBLERS

The warblers are a strictly American family of small, usually brightly colored, insect-eating birds. A large number and variety of kinds of warblers visit us annually from the tropics, and retreat in the fall. A large proportion of these pretty birds go to the far North to make their nests, and few indeed are to be counted among really southern birds. Such are the orange-yellow and green prothonotary; the brown-and-yellow Swainson's warbler, with the cinnamon-striped head; and the greenish, black-capped Bachman's warbler, all of which pass their lives in the damp underbrush along the rivers, and make their nests on or near the ground. Others are the parula warbler, gray above, with a yellow patch on the back, and yellow below, with a black breast, which forms its nest in tufts of Spanish moss; the bluish-gray myrtle warbler, easily recognized by its yellow rump and yellow crown, which spends the winter in great numbers in the Southern States feeding on the waxen myrtle-berries; the bright blue-and-white cærulean warbler, of the southern Alleghanies; the gray, black-checked, yellow-throated warbler; the brightly yellow prairie warbler, which is fond of brushy hillsides and pasture-lands; the yellow-and-black Kentucky warbler, and the familiar black-faced yellow-throat, both of which love stream-banks and swamps and nest on the ground.

The wren tribe includes besides the wrens proper, the catbird, mocking-bird and thrashers, and several of the species are distinctively southern in their habitat.

THE MOCKING-BIRD, THE AMERICAN NIGHTINGALE

Foremost among these is the famous mocking-bird, which is rarely seen north of the Potomac and Ohio Rivers, or west of Louisiana. It is noticeably larger than the catbird, measuring 10½ inches from the tip of its curved bill to the end of its long tail; and is ashy-gray above, somewhat lighter on the under surface, and has the wings and tail pale brown, the quills edged with white. It is not, therefore, a very handsome bird, nor especially interesting in manner, although elegant in form; and the affection in which it is held is a tribute to its voice. The Southern people regard it as the prince of American songsters, and compare it to the European nightingale. Formerly many were kept in cages, but they were very unhappy, and the bad practice seems to be dying out.

THE SAUCY WRENS AROUND OUR HOMES

Of the wrens two are far more common in the Southern than in the Northern States. One is the Carolina wren, which is somewhat larger than the familiar house-wren, and utters a startlingly loud song in which, sometimes, the bird seems to mimic others. Bewick's wren is more like the house-wren, but darker brown. Both are often seen in the middle West. The chickadee is to be found all over the country, and the South has a cousin of his in the pretty tufted titmouse, often called "peto" from its call, which is gray and white, with a handsome pointed crest. Another little gray bird of the southern woods is the tiny blue-gray gnatcatcher, which constructs a soft, lichen-embroidered cup of a nest balanced on a tree-limb, and hides within it five bluish, thickly speckled eggs.

THE NEXT STORY OF NATURE IS ON PAGE 2405.

THE GIRL WHO SAVED PARIS

CONTINUED FROM 2236

ABOUT the year 424 A.D. there was born at a little village called Nanterre, very near to Paris, a little girl who was destined to do great things.

Geneviève lived at a time when the Romans had civilized her people, the Gauls, and had taught them to be Christians. Even as a little child of seven she became an earnest Christian, and people loved her for her sweet disposition. While looking after her father's sheep she spun their wool in the shade of the trees. Here, like Joan of Arc, she was in close touch with the beautiful face of Nature.

After her parents' death the little girl went to live with her godmother; and as she grew big and tall and strong she became known for her piety, unselfishness, and care for those poorer than herself. Thus the little maid grew up to a beautiful womanhood.

The peaceful life of the village was disturbed by dread and horror when news came that Attila, "the scourge of God," as he named himself, had crossed the Rhine with his hordes of savage Huns, had destroyed towns on the way, and was marching to capture Paris.

The people would have fled in terror with their most treasured possessions, but Geneviève stood on the bridge over the Seine, and urged them to return to prayer, repentance, and the defence of their homes. At that moment a present arrived for Geneviève from the good Bishop Germanus, and the people, remembering in what esteem he held her, grew ashamed of their terror, and let her lead them home to pray and to arm for defence. The prayer was answered, for the danger was averted; Attila was defeated at Chalons, and then driven out of Gaul.

Paris was threatened, a few years later, with invasion by the Franks, who poured over from the north-east. They came along the valley of the Seine, and besieged the walls of Paris, which the Romans had built. These were strong enough for defence, but how could the citizens hold out against a more cruel foe—hunger?

It was at this crisis that Geneviève showed what fine courage she possessed. Finding no one brave enough to venture outside the walls to get food for women and children who were dying for want of it, she got into a little boat, and, steering it down stream, passed beyond the camp of the Franks till she could land at a safe spot. Then she went from town to town imploring the people to send help to Paris. This she succeeded in getting, and brought into the city

a convoy of boats laden with provisions. The Franks, it is said, regarded her person as sacred, and so, not daring to interfere with her, let her pass.

It would seem from this that the defenders of Paris were not very brave men, and, indeed, at a time later on, when Geneviève was away, the Franks, under Childeric, did capture the city. The Frankish chief was afraid of Geneviève's power, and, fearful that she should come before him, gave orders that she should be shut out of the city. But, hearing that some of the citizens were to be put to death, garbed in her plain shepherdess's gown and veil, she entered, unrecognized, with some country people through the city gate, and went straight to the spot in the fortifications where Childeric and his wild Franks were holding revelry.

GENEVIÈVE BRINGING FOOD TO PARIS

The scene before her was enough to make most hearts quake, and stay the courage of any but the purest, most disinterested soul; yet the brave shepherdess did not shrink from her duty, which was to rebuke and exhort Childeric, and to plead for the helpless citizens. The Frankish chief trembled before her, and granted all her request—safety for the doomed prisoners and mercy for Paris.

Geneviève, who spent all her days in works of charity and pity, lived to an honored old age, and before her death in 512 saw Clovis, Childeric's son, baptized a Christian, and the cathedral of Notre Dame founded. To this day, her memory is revered by the Parisians as the patron saint of their city.

THE DEATH OF GENEVIÈVE, SURROUNDED BY THE PEOPLE SHE HAD BEFRIENDED

THE NEXT GOLDEN DEEDS BEGIN ON PAGE 2445.

HOW LONG DO ANIMALS LIVE?

CONTINUED FROM 2251

WE cannot give exact figures about the age of animals as we can about the age of men and women. We know the age to which men and women live, because the date of their birth is entered in an official register, and the date of their death also is recorded. Famous animals which are kept by men are registered in books kept for the purpose, so we know the age of prize horses, cattle and other animals. But this does not help us quite as it might, for many animals, when old, are destroyed. If wild, they might live considerably longer.

The prize for the land animals has to be given to the tortoise. This animal lives, under favorable conditions, for between 300 and 400 years. There is one in the Bronx Zoo in New York which is stated to be over 300 years old. Next, we have to take another reptile—we read about reptiles on page 1209. It is the crocodile, which, given fair play in its native wilds, can live for 300 years.

If we believed all the stories we read, we should have to say that the toad, an amphibian, lives far longer than this. It is said to live shut up in a rock, or a tree, or in a piece of coal, and to grow fat on nothing, a close prisoner for thousands of years. We have read about this on page 1216, and we know that we must not believe anything of the sort until we have much better proof brought forward.

It takes an elephant a long time to grow up, and it takes him a long time to wear out. Well treated, he should live to be a hundred. That is the age to which the eagle is supposed to live, but some people put down the age he may reach as 200 years. Even that is young compared with the life of the whale. This can be shown to last for 500 years. We have not a birth certificate with the whale, and he does not invite us to his birthday parties and tell us how old he really is. Clever men, however, say that an ordinary whale lives to the age of 500 years, while some whales have been caught whose appearance has made the scientists believe them to be 1,000 years.

In the following tables the extreme ages of things like the whale and eagle and tortoise are not given. The tables merely set out the ages to

which certain animals often live, not the age to which the very fortunate animals among them may possibly reach.

THE NUMBER OF YEARS THAT ANIMALS LIVE

Rabbit	5	Horse	27
Sheep	12	Camel	40
Cat	13	Lion	40
Dog	15	Elephant	100
Goat	15	Crocodile	300
Pig	20	Tortoise	350
Cow	25	Whale	500

THE NUMBER OF YEARS THAT BIRDS LIVE

Wren	8	Goldfinch	25
Sparrow	10	Lark	25
Thrush	10	Canary	25
Robin	12	Peacock	30
Blackbird	12	Skylark	30
Hen	14	Goose	50
Partridge	15	Pelican	50
Pheasant	15	Parrot	60
Nightingale	18	Heron	60
Pigeon	20	Crow	100
Linnet	23	Swan	100
Crane	24	Eagle	100

It will be noticed that many animals live longer than we do, as it is very rare for man to reach the age of 100.

WHY DOES A BRIDGE GO UP IN THE MIDDLE?

Many bridges are higher in the middle, that is, between the ends, but not all. If you look at a plain girder bridge by which the railways cross many roadways, you will find that the bridge is quite level throughout its length. But an arch bridge is usually a little higher in the middle than at the ends, and in very old bridges the difference in height is very great indeed. The reason for the higher middle portion is that an arch is the strongest form of building structure. The more pressure is applied to the top of an arch, the closer are its parts pressed together. Arch bridges could easily be made with a roadway quite flat on top, but if they were made so, the roadway at each end would need to be made higher, or the space beneath the arch would be lower. So the most convenient form of arched bridge has been proved to be one which makes necessary a roadway that is higher in the middle than at the ends.

WHY IS LANCASHIRE A COTTON COUNTY?

Nature fashioned Lancashire to be a great cotton manufacturing centre. It is sheltered on the east by lofty hills, which, to a great extent, keep off dry land winds. From the south and west come winds which are moist and mild through passing over the Gulf Stream. The effect of this is that Lancashire has a very heavy rainfall, sometimes twice as heavy as that on the east coast. Naturally, then, the air of Lancashire is moist. This favorable air makes the cotton fibre soft and easy to handle.

When all is well with the climate, one hardly understands how important the weather is to Lancashire; the work goes on so smoothly as to make one think that it might be done equally well anywhere. But when there is a long spell of dry weather, and the east wind blows, then the weavers and spinners of cotton are in despair. The moisture goes out of the air, and the cotton fibre becomes like a new material. It is no longer easy to handle; it becomes dry and brittle, and cannot be made to combine.

In such weather the work people have a hard task to earn enough money to live upon. The quality of their work is not as good as they desire it to be, and the quantity of it is very small compared with that which they turn out when the weather is favorable. The worker in cotton in Lancashire is happiest when the rain is steadily falling as he works. It is not cheerful weather to be out in, but all is well with his cotton.

WHY DO BIRDS CAST THEIR FEATHERS?

Feathers become worn and torn and broken, and must be replaced. We do not know how birds manage to molt their feathers; it is one of the wonderful provisions of Nature, whose effects we see without being able to say exactly how they are caused. But the molting of birds is similar to what takes place in other forms of animal life. Horses grow long coats of hair in winter which they shed in summer. Dogs cast their coats. Snakes cast their skins; crabs and other shell-fish cast their shells. If a crab lived always in one shell his body could never grow any bigger. At a certain time in the year his flesh becomes very watery, so that he can draw those great claws of his through the narrow opening at the top of the shells in which they are enclosed, and he comes out of his shell almost as soft and pulpy as an egg in its skin with its shell removed. Birds are never

left bare like this. They molt gradually. Some are so completely robbed of their strong feathers that they are glad to go into hiding until the new ones grow. They are then as defenceless as is the stag which has shed its mighty antlers.

DID ANY OF THE APOSTLES GO TO ENGLAND?

Although many of the Apostles are said to have traveled far and wide, there is no record of any of them having gone to England. Still, this does not make it absolutely certain that none of them went. Britain was within easy reach of Rome, and we know for a fact that the Apostle Paul went to Rome. It is generally believed that Peter also lived and preached in Rome. It is just within the bounds of possibility, though not at all likely, that Paul did visit England. He tells the Roman Christians in his letter to the Romans that he hopes to go on to Spain after he has seen them. And Clement of Rome, a great and good man, in a letter that he wrote to the Corinthians in the year 96 A. D., says that Paul went "to the extreme of the west," or "to the western limit." There is a story that Paul visited South Wales and founded a college there, and the remains of what was said to be this college were discovered and dug out some years ago; but, of course, that is only a story.

There is no doubt, however, that the Apostles literally obeyed our Lord's command, and as far as possible preached the Gospel to every creature. John settled at Ephesus; Matthew is said to have preached in Ethiopia; Bartholomew visited Asia and Arabia. Thomas is reported to have founded the Church in Persia, and Andrew to have gone to Scythia. And there is very little doubt that at a very early date the Gospel was preached as far away as India.

HOW MANY WORDS ARE THERE IN THE ENGLISH LANGUAGE?

A dozen great scholars might give as many answers to this question. One of them, some years ago, gave the number as only 38,000. But a still greater scholar, Professor Max Müller, who was, perhaps, the greatest authority of his time on words, put the number of words in the English language at 100,000. He compared the growth and development of our language with the putting of grain in a sieve. Most of the chaff has been winnowed off, and with it have gone many good grains. Good old English words, which are now considered only dialect words, have gone out of the language. If we include all the words which have fixed places in the dialects of the country, and include also many which we know were spoken in earlier times, we shall have to put the total at 400,000 for the English language.

That number is constantly growing. Words have to be invented for new industries, and they become part of the language. When a new dictionary was made, not many years ago, it was found that the new words necessary for use in relation to electricity and electrical appliances numbered over 4,000. A similar increase had taken place with regard to other arts and sciences. Most of them are purely technical words, but, little by little, they become common words as all of us learn more about science; and so the language grows.

HOW MANY WORDS DO MOST OF US USE?

We need not tremble at the number of words it is possible to use. Our greatest writers find quite a small number sufficient for their purpose. Shakespeare, with all his varied writings, used only about 15,000 different words. Milton needed only 8,000 different words for "Paradise Lost," while the Old Testament contains fewer than 6,000 different words. Some people use only about 800 different words, and most of us use no more than two or three thousand.

The beauty of writing and speech lies not in the number of words used, but in the choice and placing of them. Simple language is the most beautiful. The finest English writing is in the Bible, in "Robinson Crusoe," and in "The Pilgrim's Progress," and in each of these books the language is so simple that a child may understand, while great scholars find equal delight in it.

WHY IS THE ENGLISHMAN CALLED JOHN BULL?

Every country has a nickname, and is represented in pictures by an animal. The British lion is the animal which stands for England, and John Bull is its owner and master. The lion is the

country; John Bull is the nation. The name of John Bull comes from a work written by John Arbuthnot, a witty doctor and writer, a great friend of Swift and Pope. He was born in 1667, in Scotland, and died in 1735. The sketch that he wrote dealt with the political affairs of Europe at the time, and the countries were made to appear as if they were men and women.

England was John Bull, and Queen Anne was Mrs. Bull. The Church was Mr. Bull's mother. Scotland was John Bull's sister, Peg. England, the nation and country, was made to appear like a man of very good nature, but not without faults. As roast beef and plum pudding are the national dishes, the name of Bull answered very well. John was shown to be an honest, plain-dealing man, courageous, and rather hot-tempered. He was supposed to be always ready to meet the French king with any sort of weapon, in earnest or in play. He was very difficult to deal with, especially if anyone tried to master him; but, treated with kindness and a little flattery, he could be led by a child.

"John Bull" as drawn by Sir Francis Gould, the famous artist of the "Westminster Gazette."

How did we get the picture of John Bull?

It needed only an artist to draw a fancy picture of such a man, and there was a national figure ready made to represent England for all time. When we look at the famous John Bull which Sir Francis Carruthers Gould draws in the "Westminster Gazette" we see just the man whom Arbuthnot painted in words, only this artist gives John Bull more dignity, and a less uncertain temper.

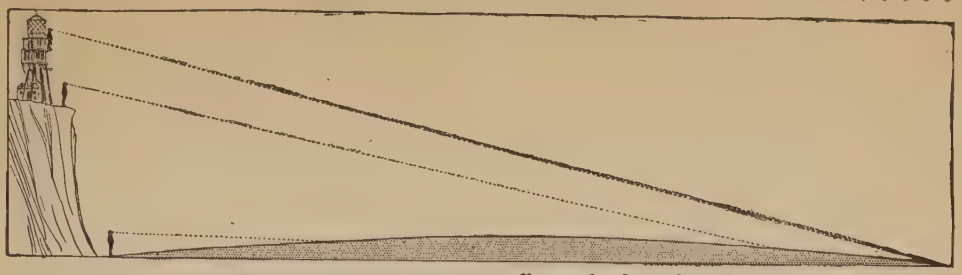
There was a John Bull in real life, a Doctor of Music, who lived between the years 1562 and 1628. He is regarded as the composer of the British National Anthem. Nobody can be quite sure who did write it, but there is reason to believe that the melody was found written down among the papers which Bull left, and that it was made the tune for the National Anthem, years after his death, and without his intending it for such a purpose.

Have we yet discovered all the world?

No; the Antarctic regions still possess secrets which as yet no man has been able to solve. Many brave men in many fine ships have gone into the gloom and silence of the frozen regions in the hope of discovering the Poles. A great many have perished in the attempt, but a brave American commander named Robert E. Peary finally reached the North Pole in 1909. In 1911, only two years later, Captain Amundsen, of Norway, reached the South Pole, and was followed a few days afterward by Captain Scott, an Englishman, and his companions, whose brave death aroused the sympathy and admiration of the whole world. Therefore, we may say that all the lands and seas have been discovered, but that is very different from saying that they have all been explored. We may discover a picture-gallery, yet not know what it contains. There is much land still to be explored in Asia. There are parts in the far north of the American continent of which we know very little. In the great sandy, stony heart of Australia there are places of which we have almost no knowledge.

Africa has been traveled from end to end, and from side to side, but we can fix a point on the east coast of Africa and come out at a point on the west coast, and cover ground which no white man has previously crossed.

But missionaries and traders are constantly going farther into the mysterious places of the earth, and learning to know strange peoples; and the unknown land is slowly becoming known.



HOW FAR OFF IS THE HORIZON?

The word horizon is Greek, and is derived from the Greek word for a boundary, which is *horos*. Of course, we understand that the horizon is not really the boundary between earth and sky, but merely the boundary between them as they appear to our eyes.

This is a question often asked by boys and girls. As we stand by the seashore, the sky and the sea seem to meet. We can see a line which seems to be the end of the sea and the bottom of the sky. That is the horizon. Similarly, if we stand upon a plain of land we can, if there are no trees or houses in the way, see where the end of the land seems to touch the bottom rim of the dome we call the sky. That also is the horizon.

Its distance depends upon how high our eyes are from the level of the sea if we are looking across the sea, or from the level of the land across which we are looking if we are looking over a plain. The picture shows clearly how this is so. The boy standing by the seashore is looking out upon the sea from a distance about 4 feet higher than the level of the sea—the height of his eyes from sea-level. He can see just a little more than 2½ miles in front of him, and his horizon is just this distance away. The eyes of the boy on the edge of the cliff, on the other hand, are 100 feet above sea-level, and he can see about 13¼ miles off, and that is where the horizon is. Again, the top of the lighthouse is 150 feet above sea-level, and if a boy looked out on the sea from this point, he would see about 16¼ miles, and his horizon would be 16¼ miles away.

WHY DO WE SEE FARTHER IF WE ARE HIGHER UP?

The scientific explanation of this would be that "range of vision is determined by the altitude of the observer." In simple language, this means that the higher up we are, the farther we can see. That is because our world is a globe. Perhaps you can understand better how this is if you stand in front of a row of houses that form a bulging crescent. Stand close to one of the houses, and turn your head first to the right, and then to the left. You cannot see much of the row of houses—perhaps only a little bit of the house on each side of the one of which you stand in front. Step back into the middle of the road, and look again. Now you can see a good many more of the houses, but still not all if the row is long. Then go to the far side of the road, and a good many more will be found to have come within the range of your eyes.

To look for the horizon is much the same thing. The earth is round, and the farther we are above the ground along which we are looking, the farther we can see. This table shows how far anyone can see at various distances

Height in feet.	Distance in miles.	Height in feet.	Distance in miles.	Height in feet.	Distance in miles.	Height in feet.	Distance in miles.	Height in feet.	Distance in miles.
1	1¼	14	5	60	10¼	130	15	600	32½
2	1¾	16	5¼	65	10½	140	15½	650	33¾
3	2¼	18	5½	70	11	150	16¼	700	35
4	2½	20	6	75	11½	200	18¾	800	37½
5	3	25	6½	80	12	250	21	900	40
6	3¼	30	7¼	85	12¼	300	23	1,000	42
7	3½	35	8	90	12½	350	24¾	2,000	59¼
8	3¾	40	8½	95	13	400	25½	3,000	72½
9	4	45	9	100	13¼	450	28	4,000	83¾
10	4¼	50	9½	110	14	500	29½	5,000	93½
12	4½	55	10	120	14½	550	31	5,280 one mile	96

from the earth's surface. At the height of 5,280 feet, which is one mile high, we can see 96 miles. The figures are generally correct, but not quite exact, because to be perfectly exact we must use fractions, which are avoided in the table that we have seen for the sake of simplicity.

WHAT HAPPENS IF AN IRRESISTIBLE CANNON-BALL HITS AN IMMOVABLE POST?

The Wise Man laughed when he heard this question, because it is a good old puzzle, which has often been asked before. But it is like a great many other questions that people puzzle themselves over, even quite grown-up people, who ought to know better; and a great deal of the quarreling about things that go on in the world is due to people trying to answer questions like this, about which we might quarrel to the end of time without getting any further. This is a question that cannot be answered, for the very good reason that it is a question that cannot be seriously asked by anyone who thinks.

A wise man has said that one of the great things that wisdom does for us is to teach us how to ask questions, and wisdom certainly teaches us not to ask silly questions like this one. For do you not see that the irresistible cannon-ball and the immovable post cannot exist together? When we say *irresistible* cannon-ball, that is as good as to say that there is no post which can resist it. When we say *immovable* post, that is as good as to say that there is no cannon-ball which can knock it down. If either of these things exists, then the other cannot exist. And so, of course, there is no answer to the question what would happen if they existed together, for it is part of the very nature of each of them, as we describe it, that the other could not exist at the same time.

WHAT DOES THE UNION JACK STAND FOR?

The Union Jack stands for British power and freedom all over the world. The name of the flag, though it seems at first to be only a name and nothing more, is really a very excellent name, because the word "Jack" comes from the old "jacks" that sailors used to carry on board ship — a kind of leather coat, stamped with the red cross of St. George. The word "Union" means, of course, the union of the three countries that make up the British Isles, and so we get the idea that the Union Jack is a sort of British Jacket — a jacket of defence for the people of the British Empire.

WHAT ARE THE THREE FLAGS IN THE UNION JACK?

The Union Jack is made up of three flags — the English flag of St. George, the Scottish flag of St. Andrew, and the Irish flag of St. Patrick. St. George, who lived about 300 years after the birth of Christ, was a heroic soldier who gave up his life rather than deny his faith at the bidding of a Roman emperor. Edward III. adopted his name as a war-cry for England, and the beautiful red cross of St. George on a white ground became the English flag. St. Andrew was one of the twelve Apostles, and he was crucified on a cross shaped like the letter X. Some relics of the Apostle are supposed to have been carried to Scotland, and the white cross of St. Andrew on a blue ground long ago became the national flag of Scotland. St. Patrick was carried to Ireland as a slave at the beginning of the fifth century. He lived there for about thirty years, founding many schools and monasteries, and died there a very old man. Many centuries afterwards, the cross of St. Patrick became the national flag of Ireland.

HOW DID THE THREE FLAGS BECOME ONE?

The three flags became one by the union of the three countries. At the beginning of the seventeenth century the crowns of England and Scotland were united, and so the cross of St. Andrew was added to the cross of St. George as the first Union flag of Great Britain. At the beginning of last century Ireland was united to England and Scotland, and the cross of St. Patrick was added to the Union flag. The flag is ingeniously arranged so as to give each cross equal prominence.

When one sees this flag flying on public buildings, or at sea on British ships, or at the British Embassy in Washington, or in far-off parts of the earth, let him remember what it means. It is not a flag of war, but it stands particularly for the memory of three good and brave men, and it stands generally as a sign that Great Britain loves freedom and peace.

THE NEXT QUESTIONS BEGIN ON PAGE 2469.

MAKING A SLED

CONTINUED FROM 2271

A TOBOGGAN is a particular sled which affords boundless delight and healthy exercise to children who live in lands where snow is as common as it is in our Northern winter. And we should find a toboggan a source of immense pleasure where and when we have one of the old-fashioned Christmas-card sort of winters, with its heavy snowdrifts, and soft, clean snow lying several inches thick in the meadows and lanes, but particularly on the steep slopes, for it is there that children can most safely use the toboggan. Toboggans were first made from curved birch bark by the North American Indians.

1. The sled

There are several kinds of sleds. One is made of iron or steel like a sleigh; the other sort is made of pieces of board nailed together. This latter kind is very easily made, and we shall make one of them. Toboggans are good when the snow is quite soft; but as it soon hardens as we glide down a few times, we shall find the sled to be very satisfactory.

2. The sled gliding downhill

To make one you must first get two pieces of board about four feet long, six inches wide, and one inch thick. These you must cut to form the two sides, as shown in picture 1. Now you must get some more wood and cut it into lengths of twenty inches. This wood should not be more than half an inch in thickness. As each piece is cut it should be nailed to the long pieces in the way shown in picture 1. The piece in front may be a little narrower than the others as it is fixed to the turned-up part. Look carefully at picture 1, and you will see two pairs of nails on the side, a little way below two of the top boards. These nails hold in position two pieces of wood stretching from side to side so as to strengthen the sides. Anyboy could make a simple sled like this in one afternoon. Probably the wood could be used from old boxes, but if not, a carpenter would sell all that is necessary for a few cents.

The best way to show the way to use the sled is to tell how it is used by the Children of the Snow, as we may call the boys and girls in Switzerland, Norway, and Canada, where such a sled is an article of every-day play in winter time. Every child has one of them. A merry party goes to where there is a good long, steep slope covered with snow. Then, one after another, the children sit upon their own sleds, and starting at the top of the slope let them slide right down to the bottom, guiding them meantime by touching the snow with their feet; and when the sleds stop at the bottom, the children walk up the slope again. Sometimes several sleds are made into one long file. One boy, generally the eldest,

goes first. He sits or lies on his sled and then another boy gets on his sled and puts it close behind the first. He stretches out his legs so that the leader can hold his ankles. All the others do the same in turn till there is a string of children on their sleds. From a little distance the long line looks like a big black snake. When they are all ready, the first boy shouts to them all to hold on tight, and then he lifts up his feet and away they all go. The long line winds to right and left down the steep snow-road, and sometimes it goes faster than any train.

If any let go and fall off they are left behind in a moment, for the line of sleds goes at such a rate that it cannot be stopped easily. Sometimes the children who fall off go plump into the soft snow and are quite buried in it, but in a few seconds they struggle out again laughing. Sometimes the whole line of swift sleds will upset, and then you see twenty or thirty children and their sleds mixed up together, and laughing so much that they cannot get on their feet again. They never get hurt, for the snow is so soft that when they tumble it is just like falling into a feather bed.

It is all fun, and they love it. The children of the Snow would not like to live in countries that have no real winters. They would not like warm winters at all. But even in the warmer countries you sometimes have snow on the ground for a little while, and so, if you feel envious of the fun the Swiss children have, you ought to make a sled and so be ready for the first chance that comes to try these jolly winter frolics of the colder lands.

HOW THE WEAVER CUT HIS CLOTH

THE friends of the weaver, whose problem was given on page 2271, had to confess themselves unable to find the manner in which the cloth must be cut in order to get the desired result, although all tried to solve the puzzle. So the weaver showed how to do it, as seen in the picture which appears herewith. It will be observed that, although there seem to be many lines, the cloth was cut into four pieces, each piece being of the same size and the same shape,

and that each piece contains a lion and a castle. To prove that each of the four pieces is the same shape, we may trace the picture and then cut out the pieces, after which, by placing the pieces on the top of each other, we will find that they fit each other exactly. It will be observed that, although each piece has a lion and a castle, in each piece the lion and the castle are in quite different positions. This is essential to the solution. It is impossible to cut the cloth correctly in any other way.

THE PROBLEM OF THE MAGIC SQUARE

IN olden times magic squares were thought to have special virtue, and were used or worn as mascots to keep off disease or bring good fortune to their possessors or wearers. The peculiar feature of a magic square is that, whether the figures in it be added up by vertical columns, by horizontal rows, or by the two diagonals —that is, the sloping columns from opposite corners—the total is the same in every case. Here is a square which is not a magic square, because the figures that make up the vertical columns, the horizontal rows, and the diagonals do not, when added up, make the same totals. But by cutting the square into four pieces, and by putting these four pieces together again in a different way, a magic square is formed in which the addition of each row, each column, and each diagonal gives in each case 34, neither more nor less. This is one of the interesting puzzles propounded by Mr. Henry E. Dudeney in his interesting book of problems called "Canterbury Puzzles." How can it be done?

1	15	5	12
8	10	4	9
11	6	16	2
14	3	13	7

HOW FAST DO YOU WALK?

THERE is a very simple way of telling at what speed one walks. Take a piece of thin string, say, 80 to 100 yards long. To one end tie a weight—a piece of lead or other metal, or even a stone. At a point 44 feet from the weight put a knot or a loop. Then put a second knot or loop 44 feet from the first, and so on along the entire length of the string put a series of knots or loops 44 feet from each other.

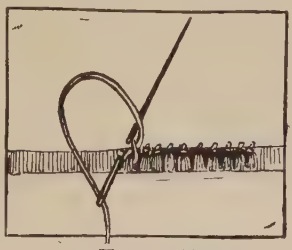
Take in one hand a watch with a second hand. Now drop the weight upon the ground, and walk along at an ordinary pace, letting the weight remain where it fell, and allowing the knots or loops to slip through one hand. The number of knots or loops that pass through the hand in half a minute are the same as the number of miles walked in an hour.

It is always well to know the reason for what we do. It is not enough to know that the number of times we walk 44 feet in half a minute is the same as the number of miles we walk in an hour. We ought to know *why* it is so. The reason is that 44 feet is the 120th part of a mile, because a mile contains 5,280 feet, or 1,760 yards, and a half-minute is the 120th part of an hour. Therefore we are able to walk 120th of a mile just as many times in 120th of an hour as we can walk a mile in an hour.

A DAINTY AFTERNOON TEA-CLOTH

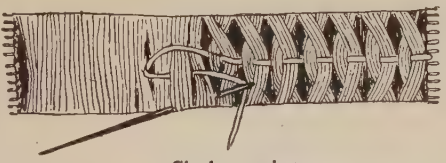
LET us see what we want to make the charming little drawn-thread-work tea-cloth illustrated on the next page. We want a piece of linen, about a yard square—not too fine, as the finer it is the more difficult it will be to work—and a skein or two of the Teneriffe cotton especially made for this kind of work, which can be bought at any needlework shop.

The first thing to do is to measure the hem. A fairly wide one is necessary, so we will allow six and a quarter inches. The quarter of an inch is for the little piece to turn in, and the six inches, doubled into two, will give us a hem of exactly three inches. When we have measured our hem we cannot turn and tuck as in ordinary work, for our corners must be left loose to draw the thread, but we mark the size of the hem by drawing one thread exactly where we shall sew the hem later on. As a matter of fact, we want more than one thread for the hem, but in all drawn-thread work the insertions are worked first, and this is what we will proceed to do.



1. Hem-stitching

The insertion as shown in the picture is really the very easiest work that can be devised, and can be done by any child who is able to sew well. We begun by removing, in one direction only, as many threads as necessary. This, of course, leaves nothing but loose strands, and it is the uniting of these into clusters which is called drawn-thread work.



2. Single crossing

First of all, however, it is necessary to measure the space which must be left between the hem and where the insertion is to be, especially if it is desired to work a fine feather-stitching as shown in picture 5, which will greatly increase the value of the work. This fancy feather-stitching has already been explained on page 730.

3. A corner

Once the space has been decided upon, draw a thread very lightly on each side at the given point. If we want our cloth to be perfectly square, we must take the trouble to count our threads, and if the linen chosen is coarse enough this will surely give very little trouble.

This one thread drawn on each side will form at the four corners where they meet a little pinprick of a hole. This is to be a little empty square, which we will later transform into a pretty wheel. For the moment we will use it as a landmark, and, inserting the point of some sharp scissors, we will cut the linen very straight, following the woven threads for two sides of the corner—that is, one inch on each side of the pinhole.

We must repeat this at each corner. Now, to prevent these cut threads becoming loose on the sides of the material forming the corner, we will immediately work a loose buttonhole stitch as shown on page 490. This will save a considerable amount of trouble, and will keep the work neat and tidy.

Now comes the most fascinating part—the drawing of the threads. By fraying out the cut part which faces our buttonholed edge, we shall have just enough hold on the threads to draw them out easily. We must not try to draw out several threads at once, for the weaving is done in threads which cross each other, and if we pull two at the same time they will press one on the other, so keeping each other in place. All the long threads being drawn out along the one-inch cut will leave us a band of loose upright threads, and on these threads we will set to work.

For a beginner few patterns are really simpler than the one which is known as *single crossing*. For single crossing, reckon the strands — that is, each lot of upright threads to be taken up with the needle—in sets of five. Two sets are necessary for each pattern.

Now we must thread our needles with a long thread, and start in the middle of the buttonhole edge at the extreme corner of the band of loose strands, as in picture 2. Bring the needle down over two sets, back up under the lower and over the upper of these sets; then go down again behind the upper and lower sets, and out below them. The thread is now drawn up, and the two sets crossed. If we repeat all along, our work will look like the insertion in picture 5.

4. Knot-stitching

A very useful stitch in the drawn-thread work is knot-stitching, so called because the thread is formed into a knot. This knot is a kind of chain-stitch, made by bringing the threaded needle out on the right side of the work at the top of the material, then bringing the thread down across the loose strands of the material and up again to the right. This forms a loop which is held down at the bottom by the left thumb. Next insert the needle to the left of the thread and under the strands to be enclosed, then through the loop, thus forming a knot to be drawn tight, by moving the thumb and pulling the working thread through. This knot-stitch is used more than any other in hemming drawn-thread work, and is the one shown in picture 4 on this page.

When the insertion, as already explained

above, has been done all round, turn in the edge of the material, fold the hem down in the usual way with the quarter-inch inside, and tuck it neatly all round, exactly along the line of the first drawn thread. The corners must be turned very carefully, otherwise they will feel thick. The open ends will have to be sewn over in little fine over-stitches. Now, we cannot work a hem-stitch without more threads being drawn, so we will again use the point of the sharp scissors and cut as many threads on each side as will be necessary to make a suitable hem—about four or five threads will be sufficient.

Hem-stitching is shown in picture 1. This is how the stitch is worked. Thread a needle with a long piece of cotton, and fasten it to the upper edge of the loose strands, at the right-hand end of them, by taking a couple of stitches, and bring the needle out three threads above the loose strands and threads. Insert the needle into the loose strands, exactly under the place where it last come out, and take three strands upon it from right to left, keeping the cotton under the needle. Draw out the needle; insert it again where it last came out, but this time bring it out three threads above the loose strands, to the left, taking up exactly the same three strands as before.

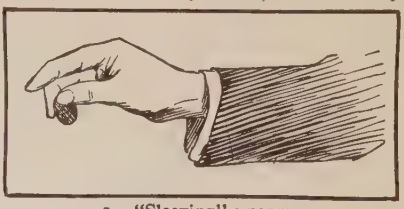
5. Tea-cloth trimmed by drawn-thread work

But what about the corners? When bands of openwork are carried along two sides of a piece of work, a space or "open square" is formed in the corner where the lines of work meet. In ordinary hem-stitching this space is so small that it may be passed over, but where more strands are drawn a filling is necessary, and this usually takes the form of some such wheel as shown in picture 3.

The foundation strands, or spokes of these, are the continuations of the working threads that have been used along the single crossing insertion. Two or more threads are then put right across from corner to corner, and the wheel is worked from the centre. The needle has to be taken alternately over and under one of these spokes, formed by the crossing threads, close round the centre until this has been surrounded four or five times. The needle is linked through the last round of the thread, between the spokes, and the thread is taken across to the vacant corner, where it is fastened off.

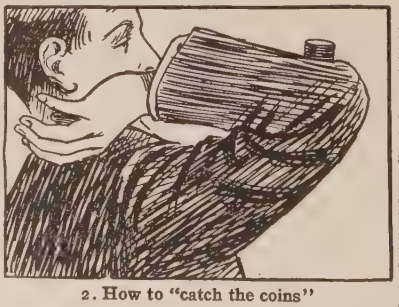
THE DISAPPEARING PENNY

A LITTLE practice enables a boy to mystify others with the trick of the disappearing penny. The conjurer offers someone a penny and as the other opens his hand to receive it he also opens his hand (apparently), and the penny has fled. This is a mere trick of sleight-of-hand, and one needs practice to be able to do it properly. The conjurer must see that the sleeve of his coat or his cuff hangs with as much space as possible below the wrist, and it is good also if the sleeve or cuff come as far down as possible. Then he takes the penny between his thumb and middle finger, as shown in picture 1, at the same time raising his arm a little above the horizontal, and as his friend opens his hand for the coin he snaps the two fingers, and the coin will disappear up his sleeve. He opens his hand and it is empty. Then as he lowers his arm by his side the penny falls down his sleeve into his hand again. When the young conjurer attempts this trick for the first time he will probably fail, but half-an-hour's practice will give him skill, and eventually, if he is careful, he will be able to do it every time he tries.



1. "Sleeving" a penny.

Taken by itself this trick may not seem very much, but it is very effective if introduced among some other tricks. The look of innocent surprize that usually comes upon the face of the poor boy who expected to receive the penny is generally very amusing indeed.



2. How to "catch the coins"

Yet another sleight-of-hand trick with coins is rather clever, and not nearly so difficult to perform as it looks. The boy puts upon his sleeve, as shown in picture 2, a number of pennies or nickles, or some of each, up to as many as six in all, when by simply bringing his arm down quickly while he holds his hand open, with the fingers slightly bent, all the coins go safely into his hand. It seems as if they ought to go scattered in all directions. A very little practice gives proficiency in this trick, but practice should be with a wall in front, so that in case of failure the coins will not go into places where they cannot be easily recovered or do some damage or even hurt a spectator. Of course these are only meant to be tricks.

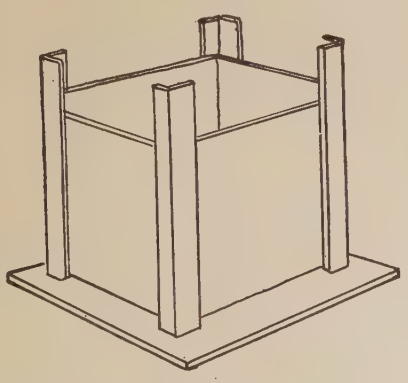
BOX FURNITURE

WE have already talked together about our tools and equipment, and we have studied the main features of box furniture, so that we know how to make the legs, or corner trim as we sometimes say, and are now ready for business. In our carpentry work we shall make lots of different pieces of furniture: a foot-stool, which is easy enough to make when you know how; a general utility box which can be transformed into a window seat; a blacking box which every boy will surely be proud to have as his very own; a dainty little rack for a vase or for books which will look very attractive in the study room; and some other things too.

Just think of the fun in transforming a plain, ordinary packing box into a flower-stand or a table book stand! Come along, big boys, little boys, and their sisters, too, for you all may join the class.

SCRAP-BOX

THIS attractive design has many uses, and it is very easy to construct. The charm of it lies in its very simplicity. For Father's den, Brother's study, or for Mother's sewing-room an artistic scrap-basket is always acceptable. Just try and see how very easy it is to make.



MATERIALS NEEDED. The grocer will probably be able to give you a box about the size of a stuffed-olive box, which is about 10 inches deep and 8 inches square. A box that is only six inches deep and seven inches square will be quite as satisfactory. For the legs or corner trim, we need four strips ⅜ inch thick, 1 inch wide, and 3 inches longer than the height of the box; and four more strips ⅜ inch thick, 1⅜ inches wide, 3 inches longer than the height of the box. For the false bottom, we need one piece of board that measures ½ inch thick and is 4 inches larger than the box each way.

DIRECTIONS FOR MAKING THE SCRAP-BOX. First remove the cover or the top end of the box. Then make the corner trim 3 inches longer than the height of the box. Turn the box upside down, and place the false bottom or base upon it, allowing the bottom to project 2 inches all around; and secure it by nailing through it and into the edges of the four sides. Eight nails or screws are sufficient to hold it firmly. If the sides are too thin to receive the nails, put them through the real bottom, and clinch the nails on the inside. It is best to nail without clinching if you can do so. Invert the box, placing it upon its new base.

Now we are ready to make the legs. Place one narrow strip with a wider one, and nail the face of the wide strip to the edge of the narrow one, forming a right angle, and making each side of the angle measure alike. To join them together, use small nails or large brads, placed a short distance apart. A little glue used before you nail the pieces together would hold it firmer. Make all four legs in the same way by putting together a narrow and a wider strip. Nail a leg to each corner, and clinch the nails on the inside if they project. A neater exterior will result if you use short screws about ⅝ inch long and run them from the inside, using four on each corner.

Having joined the false bottom to the box and added the four legs, it is now complete, and ready for the finishing touches. With a piece of sandpaper, rub it carefully, making the sides smooth; and fill with putty all the nail holes and imperfections, making the surface even. You may stain it any color you desire, but a dark mission effect is very pleasing.

HANGING FLOWER-BOX

THE scrap-box which has already been described, may be converted with a slight change into a hanging flower-box. The materials needed are the same as the scrap-box, with the addition of several feet of ordinary clothes-line.

DIRECTIONS FOR MAKING THE HANGING FLOWER-BOX. Make the scrap-box just as described before. Then bore three holes, each ½ inch, in the end of the leg which projects beyond the top of the box, one hole in one face and two holes in the other face of each leg, all located at different levels as shown by the knots in the illustration. Or you may make just one hole in each leg one inch from the end of the leg, right in the angle where the strips are joined. If you make just the four holes, then, from the rope, cut off two lengths of three feet each. Run one end of the rope through the hole, tie a strong knot on each side of the hole to hide it. Tie a number of knots, and then run the other end through the hole in the next leg. The other piece of rope is attached to the other two legs, and knotted in the middle with the first rope. Make the knots at uneven intervals,

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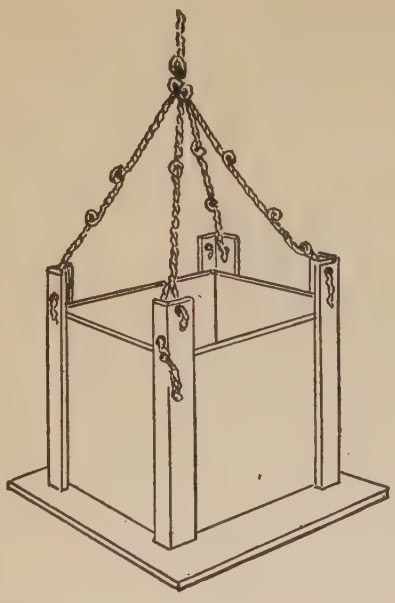
using two in some and three in others to obtain the desired artistic effect. The charm of these hanging boxes depends largely upon the clever and simple method of hanging.



This little box for holding a flower-pot is designed to be used in pairs, suspended in the window from two pulleys, in such a way that they will pass each other when the plant is drawn down to be watered. If you cannot find a pulley to use, ordinary screw eyes will serve the purpose.

If you suddenly need a little stool to hang pictures, you may instantly convert the flower-box into an ornamental little stool, simply by taking out the outside knots, removing the ropes and turning the box over to stand on its legs.

PERFORATED SCRAP-BOX OR HANGING LANTERN

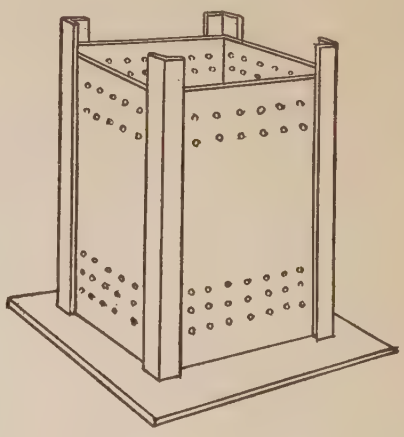
THIS convenient little article has three distinct uses. As a waste paper box or basket, it is very ornamental and unique. As a stool it simply needs to be turned the other side up. As a hanging lamp shade, to be used in the hallway where only a soft, dim light is desired, it is also very unusual and useful.

A good size for a scrap-box would be about 15 inches deep and 10 inches square, though an olive-oil box or a stuffed-olive box with slightly different dimensions would answer very well indeed.

MATERIALS NEEDED. Besides the olive-oil box we need the following materials for the legs and top: four strips ⅜ inch thick, 1⅛ inches wide, and 4 inches longer than the height of the box; and four more strips of the same thickness and length but 1½ inches wide; and for the top, one piece ¼ inch thick, and 2 inches larger each way than the end of the box. If you are going to use it as a hanging lantern, you will need the strips for the crown frame; four pieces ½ inch thick, 2 inches wide, and 8 inches longer than the outside width of the box. A dozen feet of ordinary clothes-line completes the requirements.

DIRECTIONS FOR MAKING. Remove the cover of the box and plane the edges so they will be smooth and even. Remove one side. Next place the box on its end and put the top in position so that it will project the same distance over the sides, and then carefully nail it on the box, using only enough nails to hold it firmly, and not too many to mar the effect. Turn the box over again and put on the legs, which are made in the usual way. Measure the distance between the legs, and saw the cover just the size to fit snugly in place. Hang the door, using the hinges on one side. Now then, you will need to have a ruler, a sharp pencil and a sharp eye. Mark the places for six rows of holes near the top of the lantern and four rows near the bottom, allowing one inch from centre to centre of holes. Bore the holes ½ inch in diameter where you have placed the pencil marks on all four sides. With your ruler, trace a light line on the top between opposite corners. On this line, about ¾ inch from the corner mark a point, which should be about half-way between the outside corner of the leg and the corner of the top. Bore a hole ½ inch in diameter through the projecting corner, and repeat for the other three corners.

Lay one of the lower pieces of the crown frame on top, keeping it in line with the holes, and allowing the frame pieces to project equally over the top. Mark the place for the holes and bore them ½ inch in diameter, and use this as a pattern to bore the other



three pieces. Your scrap-box is now complete. If you wish to use it as a hanging lantern, take four equal lengths of the rope, run one piece through each corner, and knot the ropes. Suspend the frame three inches

above the top of the lantern, and tie knots in the ropes to hold it in place. Place a few knots at unequal distances, and tie the ropes all together at the other end. Your artistic hanging lantern is now ready.

If you are going to stain or varnish it, do so before putting on the ropes. It may be stained a soft shade of green, or brown to harmonize with the surroundings.

FOOTSTOOL

A FOOTSTOOL is a convenient piece of furniture in any house, and the boy carpenter can easily make one, for his Mother or for himself.

MATERIALS NEEDED. A dry-goods shop or a grocery store can supply you with a box suitable for this stool. You want one that is about 12 inches square and 5 inches deep, or an oblong box that is 14 inches long, 8 inches wide and 5 inches deep. In selecting your box, choose one that is free from knot-holes, brands or other blemishes, for you want the finished article to look well. For the top, you will need a piece of wood about ¾ inch thick, and 2 inches greater than the box in length and width. If the box is 12 inches square, then this piece must be 14 inches square. For the legs, we need four pieces, ⅜ inch thick, 1⅜ inches wide, and 7 inches long; and four other pieces, ⅜ inches thich, 1¾ inches wide and 7 inches long.

DIRECTIONS FOR MAKING THE FOOTSTOOL. Make the legs in the usual way by joining the two pieces, and then round off one end of each leg, so that there will be no sharp corners to split when the stool is moved along the floor.

Take the cover off the box, and turn the box upside down, and nail a leg on each corner, carefully clinching the nails on the inside. Turn the box right side up again, setting it on the legs, and then place the false top in it, allowing an even projection on each side. Nail this top on securely, using about two nails over each leg, so that it will look neat.

The footstool may be improved for use in the kitchen, where the cook likes to have a useful stool with a place for the hand on the top so that she may carry it in one hand when the other hand is full. To make the opening for the hand, mark with your pencil the middle of the top piece, then bore two holes and saw out the wood between them, making a hole about an inch wide and two and one-half inches long. Smooth the edges with sandpaper. This stool is useful in the nursery for the play table, or handy for Mother to have when hanging pictures, and in fact is serviceable in a dozen different ways.

If you wish to use your footstool as a fern-box it may be made in such a way that it will serve two purposes. We know a little boy who made this article from a Baker's Chocolate box which measured 9½ inches wide, 10¾ inches long, and 4¾ inches deep. The legs were made 4 inches longer than the box. The top, which was made from a piece of board which the carpenter cut for him, measured 11¼ inches wide and 12½ inches long.

He preferred to use screws, and so bored four small holes through the inside of the box into each leg, and then with the screwdriver finished securing the screws. His screws were short enough not to show on the outside of the legs, and yet long enough to hold the legs firmly to the box. For use as a fern-box he inverted the footstool and placed a large drooping fern inside. The effect was very pretty.

HOW TO TELL TIME BY THE SUN

IN primitive times and even in the early days of our own country, time was reckoned by the rising and going down of the sun, the shortening and lengthening of shadows. The savage still uses primitive methods for noting time. He sets a stick in the ground and marks its shadow with a stone, so that a party following him may estimate the leader's distance ahead by noting the changed position of the shadow which measures the length of time since he went by.

This gives the idea of the sun-dial, which marks time by the shadows and indicates noon when the shadow is shortest. The simplest form of sun-dial is a tree-trunk or post standing "plumb," by which we may follow the changing direction of the shadows thrown by the sun. But this dial is not accurate, for in winter the shadows are longer than they are in summer, and the sun itself does not keep good time, for some days it is fast and some days it is slow. There are only four days in the year when it is strictly on time, April 15th, June 15th, September 1st, and December 25th. The post must be parallel to the axis of the earth, so that the shadow will be the same all the year around. Only at the North and South poles would the post stand straight up and down.

The old-time stick method of telling time was used by our great-grandmothers, who could tell it was time to cook dinner when the sun's shadow fell at a certain point. Some became expert in telling time by the way the shadows fell across the porch or doorway. It is easy enough to tell when it is nearing midday, for then a man's shadow becomes slowly shorter until it seems to be fixed, the sun having reached its highest point, and it is easy too to tell when it is just past noon, for then the shadow becomes slowly lengthened. This crude method of telling noontime is just the same as the accurate method of "taking the sun" to determine noon at sea, when the mariner with his instrument, the sextant, measures the angle between the horizon and the sun.

WHAT PLACE ARE WE IN?

THE GAME OF WHERE IS IT?

HERE is a game to play while we are sitting round the fire on a cold winter's day. One boy reads out the descriptions given below, and the game is to guess the places.

The answers are given in that part of our book beginning on page 2515.

THE CITY OF CROWDED STREETS

1. How hot it is! The sun's rays beat down from a cloudless sky so fiercely that our eyes turn with relief to the broad river speeding by eastwards. Low down on the banks are crowds of people with brown skins, and here and there some wearing white turbans. They are bathing in the water and crowding up and down stone steps, leading to curious little buildings. Can these be little temples? Further along the banks steamers are busy loading indigo and saltpetre to take away to England. All around we hear strange speech, and we look in vain for clean streets. How narrow and crooked they appear!

THE CITY WITH THE GOLDEN DOME

2. It is winter, and we are in a big city where the streets are deeply covered with snow; there is no sound of vehicles, only the tinkling of sleigh-bells and voices to break the silence. The shops have signboards and objects hung outside to tell what they sell, because many of the people cannot read, and certainly we cannot recognize the letters. We follow the way the sleighs take and come to a cathedral with a golden dome and wide granite pillars at the entrance. In front is a river—but a river frozen over. The ice will bear carriages; it will stay there till the spring, and when it melts there will be a religious ceremony and a blessing of the waters.

TREES FOR EUROPE'S SHIPS

3. We are in a country covered with thick forest, so dense that it is only with great difficulty we can make a way through it. Hark! That must be men sawing wood and chopping down trees, and a young Englishman, wearing a white helmet, is directing them, and—why, yes; those big animals working so hard are elephants. They are piling up the big logs with their strong trunks as though they were handling little sticks, and others are dragging along the chained trunks. The Englishman tells us they are clearing a way for a railway through the forest, and the teak-trees they are cutting down are going to countries in Europe, to be used for building ships. He says there are nearly twenty thousand square miles of tropical forest, and that some tigers and leopards have been seen near. Do you know what country we are in?

WHERE STARS COME QUICKLY

4. What a flat mountain! It looks as though a giant plane had been used to cut off the top. The mist lies like a white dining-cloth on it, and dotted about the lower slopes and nestling under them are pretty low houses surrounded by verandahs and sheltered by trees. Arum lilies are growing wild, for the air is quite warm. Away over the sea the sun is setting, and a large vessel is steaming out of the harbor to make its way northward to England. Perhaps it is carrying diamonds, feathers, wool, or wine.

The town reminds us of a Dutch one, but the cathedral is English, and there are plenty of English names over the shops. Night comes quickly, and the stars soon appear; but we look in vain for the Great Bear.

SIX RIVERS FLOWING INTO A BAY

5. These people must be English for we understand what they say, and could easily ask where we are; but let us see if we can find out without troubling anyone. Before us lies a fine stretch of water enclosed by land on the west and east and north, and with half a dozen little rivers flowing into it, somewhat like fingers joined on to the palm of a hand. And do you notice that long, long wall in the distance with a lighthouse at one end? Big steamers from Asia and Australia are at anchor in this harbor. "Boom!" goes the midday gun in the fort on little Drake's Island.

It is going to rain, so let us explore the lighthouse close by. The man in charge takes us up it, and tells how it was brought in pieces from a rock fourteen miles out to sea, where a new lighthouse now stands. We face about landwards and look down over the town at the hills, rivers, and blue moorland in the distance.

IN THE TRAIN FOR DAYS

6. We are standing among wheat which grows all around us as far as our eyes can see. The land is very flat, and the air pure and sweet. About a mile away is a large wooden farmhouse. In the distance we see the smoke of an engine. It is coming nearer; now we see the train, and notice it is made up of large saloon carriages, and that the engine has a "cow-catcher" in front. The passengers have been in the train for days, taking their meals and sleeping in it; and before leaving it some will have traveled right over high mountains among snowy peaks, where the brown bear hides away. What is the railway?

WHERE THE COCOA-NUTS GROW

7. We seem to be on an island in the midst of a big sea, for there is water everywhere, except here and there where small islands are scattered about. We are standing on a beautiful white sandy shore, dotted with lovely colored shells. It is only one o'clock in the day, yet, when we look at our little pocket compass and then at the sun in the sky, we find the sun is to the north of us.

Away inland the ground rises in terraces, forming a kind of a amphitheatre, up to the highest point in the middle of the island, which looks about 8,000 feet above the sea, and reminds us of a broken-down volcano. We turn up one of the gorges, and see palm-trees with cocoa-nuts growing on them, great tree-ferns, sugar-canes, and oranges. We meet some contented-looking, brown-skinned natives, who tell us in broken French that they are going to dive for oysters to get mother-of-pearl from the shells that they find.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 2515.

THE STOMACH AND DIGESTION

AT the end of the last story, on page 2174, we left the food when it had passed through the mouth and entered the stomach. Here we learn what the stomach is and what are its uses. We learn, for instance, that just as the mouth and teeth protect the stomach from what is not fit for it, so the stomach protects the bowel from what is not fit for it. Then the stomach produces special chemical substances that change the food, and, besides all this, it churns the food for some hours after every meal, so that when it enters the bowel it is much changed, and is ready for the bowel to act on. The bowel itself is still more wonderful and useful than the stomach, and it is helped in its work by various glands, such as the pancreas and the liver, which pour their own special juices into it. Then the bowel passes into our blood what is fit for it, and by this we live. Nothing is of any use to us but what we absorb into ourselves—and this is just as true of what we hear and read as of what we eat.

HOW TO EAT & BE HEALTHY

CONTINUED FROM 2174

WE have seen how the food, properly chewed and mingled with saliva, is swallowed and so finds its way into the stomach. This is the largest and most important of the hollow organs of the body; but when we call it hollow, we must not fancy that it is something like a football, with a great space inside it. There are no such unfilled spaces in the body; and when the stomach is empty, as it should be for some time before every meal, its walls are pressed against each other. When food enters it, they make room—and the greater the supply of food, the more the stomach enlarges in proportion. A healthy stomach always accurately fits its contents.

The stomach is a muscular bag which lies in the abdomen—that is, the part of the body which we usually call "the stomach"—rather to the left side, and under the left part of the liver, which is the largest gland in the body. This bag has two openings in it—one on its upper side, which is the opening of the gullet and admits the food; and one on its right, where the stomach becomes narrow and almost pointed, and leads into the bowel. The walls of this bag are beautifully made, first of a very smooth coat on the outside, which enables it to move freely against its neighbors; then of a middle coat, which is made of muscular fibres; and finally of an inner lining, a mucous membrane, which is wonderfully skilful.

The middle or muscular coat is made of three layers of fibres running in various directions, and it has most important duties. It *churns* the contents of the stomach. When we have eaten anything, these various fibres start moving in a regular way, for a long time—even three or four hours—sending the food from end to end of the stomach, backwards and forwards, and turning it over so that every part of it can be properly digested. Also, as the walls fit closely on to the food, whether we have taken much or little, they help to crush and soften it. But the stomach possesses no teeth, and its walls are thin, and far less powerful than the thick muscular walls of the heart. A bird or a fowl has no teeth, but as a substitute the walls of its gizzard are very strong, and it swallows pebbles which help grind its food after it has been somewhat softened in its crop. If we do not use our teeth, the stomach cannot do their work for them; but its muscular wall does its best.

If people eat too quickly, and do not chew their food enough, and especially if they also eat large meals, the muscular coat of the stomach

naturally gets tired and stretched and flabby, and cannot churn the food properly, and then we get indigestion; but this never happens if the stomach is properly treated, and if we keep our blood in good order, so that the muscular fibres are well nourished by it.

THE WONDERFUL LINING OF THE INNER COAT OF THE STOMACH

The inner coat, or lining of the stomach, is still more wonderful. It is a mucous membrane—that is to say, it has tiny glands in it which produce mucus. But that is not all. It also has, at least, two other sorts of little glands in it. These glands are little pits, or tubes, in the lining of the stomach, lined with living cells which have a most remarkable power. One sort of these glands produces the substance which we studied on page 1813 under the name of hydrochloric acid. We have already learned that a salt results from the combination of an acid and a base. Now, table salt or common salt is sodium-chloride, and it is a necessary part of the food of all living creatures, including ourselves. In us, and in a large number of animals, it is perhaps one source of the hydrochloric acid produced by the "acid glands" of the stomach.

The sodium-chloride, or salt, is brought to the cells of the glands by the blood, and they split it up into its parts. They pour into the stomach hydrochloric acid, which serves a most important purpose in digesting the food. If a chemist desires to split up sodium-chloride outside the body, he can do so, but only with a great deal of trouble and by the use of very powerful substances which are not found in the body at all.

A THING THAT NO MAN UNDERSTANDS AND THAT MEN CAN ONLY MARVEL AT

No one understands at all how it is that this very strong compound can be split up by the cells of the glands in the stomach, without any difficulty or the use of any powerful acids. We can only put it down to the power of the life of the gland-cells, and marvel at it.

Sometimes, when people are ill, their stomachs cannot produce the hydrochloric acid they need to digest their food, and then the doctor gives them hydrochloric acid as a medicine. It enters the stomach, and does just what is needed; and in such cases its effect in making the person better is almost like magic. Such persons owe their relief to the study of the body, which has taught us that the stomach, when healthy, produces this acid, and that our food cannot be digested without it.

Every time we take salt at our meals we should remember what use the gland-cells of the stomach will make of it—not at once, but when it has entered the blood, and has been carried by the arteries to nourish and supply the stomach wall.

The second kind of special gland in the stomach—and neither kind is found anywhere else in the body—is no less wonderful. If we look at the cells of these glands under the microscope, as they are *before* a meal, we find a number of little specks of something lying in them. These specks have been made by the cells—from the blood, of course. But if we look at these cells, taken from an animal *after* it has had a meal, we find that all the specks have quite disappeared.

THE LITTLE SPECKS OF PEPSIN AND THE WORK THEY DO AFTER A MEAL

The reason for this is that, about half an hour after a meal enters the stomach, these specks of stuff are melted by the gland-cells and poured into the stomach, where they are mixed with the food as it is churned. These specks of stuff consist of a *ferment*, called pepsin, without which the stomach cannot digest the food. Often, when people are ill, and their stomachs are not making pepsin properly, we take the stomach of a calf, get the pepsin out of it—it is got as a yellowish powder—and give it as a medicine to the ill person. This enables him to digest his food; but it is really the cells of the stomach of the calf that are digesting it for him.

If either hydrochloric acid or pepsin be given to a healthy person, his stomach ceases to produce them for itself. This is another instance of the great law of all life, that the health of any part of the body can be maintained only if it does its own work. If its work be done for it, it becomes lazy and helpless. Pepsin can easily be got at any drug store, and many unwise people now dose themselves with it, not knowing that they are thereby preventing their own stomachs from doing their own

work. When you start taking pepsin regularly, then you must go on doing so, for your stomach is made lazy and incapable. The only right time to give pepsin—except for a very short period—is when we know that the stomach has become quite unable to make it for itself.

How starch is turned to sugar in our bodies

Now we must see what the hydrochloric acid and the digestive ferment pepsin do to the food. First, we must know that, for about half an hour after a meal, these things are not produced at all. During that time the starchy matter of the food is being turned into sugar by the ferment which the saliva brought to it. When that is sufficiently done, the stomach pours forth its own products, and then the digestion of the starch must cease, for it can occur only when the food is alkaline—which the alkaline saliva makes it—and so it must cease when the contents of the stomach are turned acid by the hydrochloric acid that is poured into it. Now begins the second stage of digestion in the stomach. The hydrochloric acid first acts upon certain parts of the food, and makes them ready for the pepsin. The pepsin then ferments or digests them, until they are changed into new susbtances which are fit to be taken into the blood.

Thereupon the stomach opens its door into the bowel, which is guarded by a strong ring of muscle and has been tightly shut all this time. The stomach contents pass through into the bowel, a small quantity at a time, then a pause, then another dose, and so on, until the stomach, which has been shrinking again all the time, becomes empty.

The uses of the stomach, and how life is possible without it

Thus we can learn the uses of the stomach. It is a place where the saliva can digest, or begin the digestion of, the starch of the food. It is a bag which holds a quantity of food and takes care of it, so that we can eat a meal and go about our business until we need another. It is a guardian of the health and right working of the bowel, for it admits nothing but soft, almost liquid, stuff to the bowel, and that only in suitable quantities at a time. And it is a living bag which, by its living power, produces ferments to digest the food, and churns the food about so that these ferments can get to every part of it. As a matter of fact, the stomach produces more ferments than one, and more acids than one, but we have named the principal ones.

We usually rather overrate the importance of the stomach, notwithstanding all its powers. It is quite possible to live happily and healthily without a stomach at all, when the stomach has been entirely removed by an operation, and the food passes straight into the bowel from the gullet. Of course, in that case people must take small meals, and certainly they must use their teeth well.

The food is digested in the bowel, and we shall have to learn that the digestion which goes on in the stomach can be done without, and is never the most important part of digestion. All the digestion that the stomach does, and that the saliva does, can be done entirely within the bowel. This is not to say that the saliva and the juices of the stomach are not important and valuable; but it is to say that, in this all-important matter of preparing the food for its entry into the blood, the body has more than one or two or three "strings to its bow," as people say.

The tube which disposes of the useless part of our food

The three classes of our food that require digestion are the proteids or albumins, the starches and sugars (called carbohydrates), and the fats. The first group are partially digested in and by the stomach; the second group are partally digested in the stomach, but not by it; the third group are not digested in the stomach at all. Thus the fat in milk, which, when it rises to the top, we call cream, undergoes no change in the stomach, but floats to the top of the food there as it does in milk. There is only one part of the body that can digest everything properly, and that is the bowel.

The bowel is a very long, coiled tube, which begins where the stomach ends, and ends in a straight part called the rectum, where the useless part of the food, and also a substance called the bile, which the liver sends to the bowel, is collected and disposed of every day by healthy persons. This is not a subject that people think it suitable to talk

about much; but it is a very wrong and improper thing to think it an improper subject of study or knowledge. It is part of the wonderful working of the body, and just as perfect and worthy of our admiration as breathing or the beating of the heart.

THE LONG TUBE WITH THREE COATS WHICH RECEIVES OUR MEALS

The bowel is some twenty-five or thirty feet long, and this extraordinary length teaches us that it must have some very important work to do, which requires time and thoroughness. Every meal we eat spends from twenty-four to thirty-six hours in the bowel, being digested all the time, and sorted out and prepared for use and for the disposal of what cannot be used.

The bowel, like the stomach, has three coats, and they are of the same kind. The middle coat, however, is made of muscular fibres that mostly run right round the bowel or tube, in circles — not of fibres running in all directions. The reason for the difference is that the contents of this long tube do not require to be churned backwards and forwards, for the stomach has already softened them and made them almost liquid. They require merely to move slowly onwards, and the circular fibres of the muscular coat of the bowel contract, one after the other, in a slow movement like a sort of wave. We are quite unaware of these movements, though we can often hear the curious little noises which they make as they send the food along. Sometimes — as when we have eaten green apples, or have not properly chewed our food — the bowel makes these movements rather strongly, and *then* we become aware of them, and say we have stomach-ache or "colly-wobbles" — a very expressive word — or colic.

THE WONDERFUL GLANDS AND THE WORK THEY DO IN DIGESTING OUR FOOD

But it is the inner coat or lining, the mucous membrane, of the bowel that is specially wonderful and interesting. Besides the glands that produce mucus, like those in the mouth and nose and many other places, it has a large number of special glands which produce digestive ferments for fermenting, or digesting, the food. Already we know quite a number of special ferments which different parts of the bowel produce, and there are doubtless many more. But the bowel does not produce the most important and powerful of the digestive ferments any more than the stomach does. They are produced by a special gland called the pancreas, which we find in all animals that have backbones, and which sends its juice through a special little tube that opens into the bowel about four inches below its beginning — so that the food from the stomach is very soon exposed to the action of this remarkable juice.

The pancreas of the ox is often eaten as a great delicacy, especially by people who are ill, and by people who do not mind paying a good price for what they eat — and it is usually known as sweet bread. The juice of the pancreas, or sweetbread, contains at least four ferments, three of them being the most powerful ferments that we know. One of them digests albumins or proteids, one of them digests starch, and another digests fat. This is the first time the food has met anything that can deal with the fat or oil in it, which is one of its most valuable parts. Neither the saliva nor the juice of the stomach is of any use in dealing with fats.

THE CELLS OF THE PANCREAS AND THE WAY IN WHICH THEY HELP US

The cells of the pancreas are not unlike gland-cells seen anywhere else. They, too, have specks of stuff in them which they have made, and which they melt and pour through the tube of the pancreas into the bowel when food enters it. The food, when it leaves the stomach, is acid, and this acid, when it enters the bowel, is the signal to the pancreas that its juice is wanted. If, for any reason, the juice of the pancreas is not forthcoming, we find that the person cannot digest and use the fats in his food. All his digestion suffers, but the digestion of fats suffers most, for there is nothing to take the place of the juice of the pancreas in this respect.

The liver sends its own product into the bowel, as the pancreas does, and just at the same place. This product has the special name of bile; and when anything is wrong with its production, we say that the person is bilious. The bile is brownish yellow in color, and its color is due to the remains of the red matter, or hæmoglobin, of old red blood-cells that have been broken down in the liver. The bile is a help to digestion

in many ways, though it does not contain any ferments. It seems to prepare the fat of the food for the juice of the pancreas to act on, and it does this by breaking up the fat into a number of very tiny drops which can easily be acted upon and digested. We say that it turns the fat into an "emulsion." Also, the bile is very poisonous to microbes. So, indeed, is the hydrochloric acid produced by the stomach, and, as a general rule, if our stomach and liver are healthy, their products destroy all the dangerous microbes that we may happen to swallow.

How the strength of our food enters into our blood

Now, when the food has been digested and turned into new chemical substances which are fit to enter the blood, the part of it which is of no use—such as the hard and almost woody stuff in the stalk of a cabbage—is passed along the bowel until at last we get rid of it. But now the useful, digested part of the food has to enter the blood. This it does in a very special way. Throughout many feet of the bowel we find a new kind of thing occurring in its mucous membrane. These things are little projections—there are countless thousands of them—which stick out a little towards the inside of the bowel. They are covered with a layer of cells, and are richly supplied with capillary blood-vessels. Their business is utterly different from the business of any of the glands we have been reading about. They exist not to digest the food, but to absorb it—to take it into the blood when it is digested.

The thousands of clever little cells that pass the food into the blood

The whole object of eating is to get into the blood the substances it requires. Everything else is meant to prepare the food for its absorption into the blood. The cells covering these tiny projections of the mucous membrane of the bowel are alive, and extraordinarily clever. They pick up from the contents of the bowel what is ready for the blood, and pass it through themselves and through the thin walls of the blood-vessels that are pushed in little loops into the projections, and then it is carried by the blood-stream to every part of the body. We can take a piece of the mucous membrane of the bowel of an animal, and if we keep it warm we can watch it *living* for a time.

We can see, then, how the cells covering these countless little projections do their wonderful work, and we notice the very curious fact that, while they pass into the blood all the other parts of the food that has been made ready for them, they do not pass the fat into the blood. The fat is passed into another set of tiny vessels called *lacteals*, from the Latin word for milk, which is *lac*, and so it is carried upwards through the body until the lacteals pour the fat into some of the large veins that lie near the neck. The lacteals have this name because, after a meal, they look as if they were filled with milk. It is the drops of oil or fat in them that give them this milky appearance. We do not know why the fat of the food should have this rather roundabout way of getting into the blood.

How we may eat without gaining strength

And now we must learn the great lesson that we live not by what we eat, but by what we absorb. If a man were to eat the best food in the world in large quantities every day, but were not to absorb it into his blood, he would die of starvation as surely and as quickly as if he ate nothing at all. The food is of no use so long as it is in our mouths or in our stomachs or in our bowel, but only when it is in our blood. If it does not enter the blood it is all wasted, and until it enters the blood it does nothing for us.

Foolish people who have something the matter with the wonderful machinery we have described, or who do not care whether they eat too much so long as it tastes nice, may be surprized that their food does not give them strength. They forget that we live only by what we digest and absorb, and that may be very little, though we eat very much.

And other foolish people do the same with their minds, or, most of them, with the minds of children. Grass is good food for an ox, for the ox can digest it. It is useless and worse than useless to us, for we cannot digest it, and if we cannot digest a thing it does not matter how steadily we eat it. A child's mind can "inwardly digest" only certain things, and only those things are of any use as food for its mind. If other things, which

it cannot digest, are given to its mind—such as lessons or hard books fit only for grown-up people—then it gets indigestion; it loses its appetite for learning, and it gains nothing at all. You might as well feed a child's body on grass, as feed its mind on some of the things which children's minds used to be fed with, and, I am afraid, are still sometimes fed with. If what we have been reading about here cannot be digested by your mind, it is worth no more than if the paper of this book were given to you for your supper or your breakfast. You might chew it ever so well, but you could not digest and absorb it; and you would die of starvation.

But all this does not mean that you are to do nothing for yourself. The body has to work hard and steadily after we take a meal, or it cannot be digested. If it is not digested, it cannot be absorbed, and we must die of starvation. In just the same way the mind must work after a meal.

WHY THE MIND NEEDS FOOD AS WELL AS THE BODY, AND HOW TO FEED IT

As we have seen, the food of the mind must be of a kind that the mind can work upon; but when we have seen that the food is of the right kind, and when your mind has got it, then it is for *you* to digest it. No one can do that for you, any more than your father or mother can digest your dinner for you. They supply the dinner, but it is of no use unless it is digested and absorbed, and you alone can do that.

They can supply you with food for your mind, and the right sort of food, but you alone can digest it. If you do not digest and absorb the food for the mind in this book or in any other, it may please you at the time, just as useless or even poisonous food may please the mouth when we eat it; but it will be of no real use, and will be worth nothing for the life of your mind, which is the life that your body exists for.

So the great queston is: "*How can we digest our mind's food*? And the answer is, first, by *thinking it over*. Just as the tongue and the stomach, and the muscular wall of the bowel, turn the food over and over, so we must think over the things we read and hear. Then they are ready for digestion. Digestion is turning the food into other things best suited for absorption. Well, you must change what is said in this book into *your own words*, look at it in your own way, think it out over again for yourself; throw away anything you find bad or useless, as the bowel does with the food: combine what you learn in the story of life with that you learn in the story of the earth—and so gradually these lessons will become absorbed into your mind.

FOOD GIVES THE BODY STRENGTH; FOOD OF THE MIND GIVES US LIFE & POWER

Then, just as the food, entering the blood, gives life and power to the body, so what we learn, when it is really absorbed into our minds, gives them life and power; and just as the body, supplied with food, is ready to act and to move, so the mind, if it absorbs good mind-food, is made fit to act—to think new thoughts and to guide our conduct.

One thing more. The body needs a new supply of food every day from birth to death. It does not do just to eat when we are small and then to stop when we grow bigger. We have to take in fresh food all our lives, or our lives will end. The same is true of the mind. It does not do only to learn things at school, and then to stop. There must be new mind-food for the mind all our lives, as there must be new body-food for the body all our lives. If not, the mind will starve and pine, or even die. There are too many people in the world who take great care to go on feeding their bodies, but who have long ago stopped feeding their minds, or who feed them only with food which is not nourishing, and cannot be absorbed, but is forgotten; and their minds *do* starve and die.

THE DIFFERENCE BETWEEN THE BODY & THE MIND, WHICH GROWS FOR EVER

But if we are wise we go on feeding our minds; and we discover the wonderful fact of the mind which makes it different from the body, though we have seen how similar are the laws of the two. This difference is that, though the body stops growing after a time, so that the best food, perfectly digested and absorbed, will not make it any taller or stronger, the minds of human beings, if daily fed with good books and thoughts and talk, beautiful sights, and noble music, will go on growing, getting wiser and better, as long as we live.

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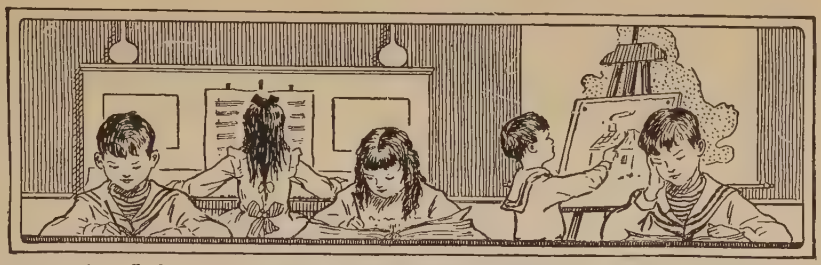


READING

MAKING NEW WORDS FROM OLD ONES

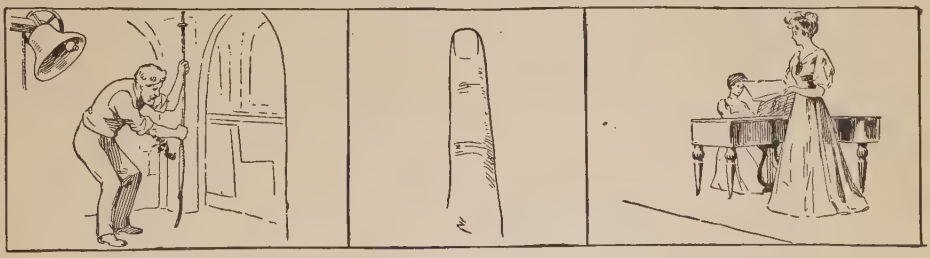
CONTINUED FROM 2234

IT is a long time since we had a really proper reading lesson, so we had better have one now, something like the lessons which we had at the beginning, only harder; for, of course, we are getting on splendidly now, and do not want words that are too easy.

It is interesting to take a word of two syllables—like AD-DER—and see how many words you can make of it by putting letters on in front, like this:

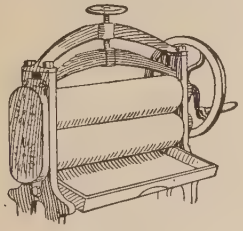
ADDER LADDER BLADDER

Then take the two syllables IN-GER. They do not make a word by themselves, but suppose we try them in this way to see what we get:



RINGER FINGER SINGER

Then try putting another letter in, and we shall get these words:



WRINGER FLINGER SLINGER

WRINGER—a mangle. FLINGER—a man who flings or throws something.
SLINGER—David was a slinger, when he put a stone in his sling and killed Goliath with it. We all know the story quite well.

Just look at those words again carefully.

What is a Ringer? A person who rings.

What is a Singer? A person who sings.

What is a Flinger? A person who flings.

What is a Slinger? A person who slings.

So we learn from this that if we add the letters ER on to a word that means to do something, we make a new word that means the person who does it. Let us see if this is true in other words:

If you BUY marbles, you are a BUYER.

If you SELL them, you are a SELLER.

If you OWN silk-worms, you are an OWNER.

If you LEND money, you are a LENDER.

If you READ this, you are a READER (and quite a good one, too).

Now for two or three longer words, with three syllables; we have not had such long words yet, but there is no need to be frightened.

If you GARDEN, you are a GARDENER.

If you play CRICKET, you are a CRICKETER.

If you play FOOTBALL, you are a FOOTBALLER.

To close this lesson, I should like you to learn these lines. They are better than nursery rhymes, and there are no hard words in them:

When in the morning we arise,
What beauty meets our opening eyes!
We learn from flowers and sunny skies:
That God is Love!

As all day long we go our way
In school, or playground, work or play,
How all around us seems to say:
That God is Love!

When comes the darkness of the night
We have no fear, we feel no fright;
The stars above are shining bright:
And God is Love!

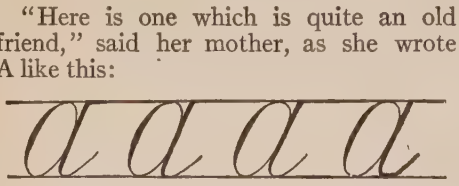
So through all time, and all life long,
For young or aged, weak or strong,
This is the great eternal song:
Our God is Love!

WRITING

LEARNING TO WRITE CAPITAL LETTERS

WHEN next Tom and Nora brought paper and pencils for their mother to show them how to write the capital letters, Nora asked if there were any more capital letters like small ones, for both Tom and she found them so easy to write.

"Here is one which is quite an old friend," said her mother, as she wrote A like this:



"You will both write that easily," she then said. "Some of the capital letters are written in two different ways. A is one of them."

"May we learn the other way, too?" asked Tom. "Perhaps one is nicer than the other."

"You shall see," his mother replied, as she wrote some other A's like this:

"This A starts with Tom's little curled spring near the lower line, and makes a long up-stroke to the right double the height between the lines, and then comes down to the lower line with a thick down-stroke, and makes one of Nora's pretty loops over the up-stroke."

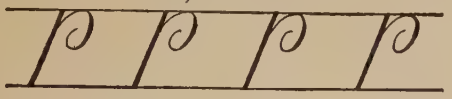
"Like tying a bow," added Nora. "Mother, the first A is the easiest to make, but this A is a pretty letter."

"So it is," said her mother; "and no one could mistake it for a small a."

When Tom and Nora had written both A's, they were shown how to make capital O, like this:

"That is an oval, mother, like small o!" exclaimed Tom, who remembered the hat and the dish; "but it does not end in the same way."

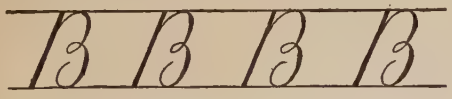
"No," said Nora; "it tries to tie itself in a knot at the finish." And she and Tom busily set to work to make O's that tried to tie themselves into knots. When they had written them, their mother said, "This is P":



"See, the pencil makes a long down-stroke, then returns up over the down-stroke and out to the right, with a big curve about half the distance of the stroke, and ends in the middle of the curve."

The down-stroke and up-stroke were quite easy, but the curve had to be tried two or three times before it could be written well. Tom tried to think of the first part of X uncurled, and Nora thought of capital O, but starting on the left and untied.

"P will help us to make B," their mother told them when they had finished it. "Here is B":



"B is just like P until we get near the end of the curve; then the pencil turns round to the right, makes a small loop, and ends with another curve touching the bottom line."

"It seems as though B had grown out of P, like j from i," said Nora, while she was copying her mother's letter.

"I think not, Nora; but they are near relatives. We use our lips to make them both. Watch mine while I say P, B."

Nora tried saying P, B, then Pay, Bay, and understood how her lips made both P and B.

"The last letter we are going to make to-day is something like B," their mother told the children as she wrote some letters. "It is R. What do you think of it?"

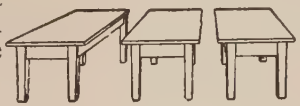
Both the children saw how much it was like B. It started with the same long down-stroke and up-stroke as P and B, and the first large curve to the right was the same. The loop in the middle was like the loop of B, but the last curve went round to the right instead of to the left as in B, and opened outwards.

"If we notice the difference between P, B, and R very carefully now," their mother said, "they will give us no trouble in the future, and will be easy to remember. Three little brothers—Percy, the youngest; Bertie, the middle one; and Roy, the eldest."

ARITHMETIC

HOW TO MULTIPLY NUMBERS

HERE are three tables, each with 4 legs. How many legs are there altogether? To find the answer to the question we must add together 4 and 4 and 4, which tells us there are 12 legs altogether. Now, instead of saying 4 and 4 and 4 make 12, it is simple to speak of "three fours," and say "three fours are twelve."



Again, if the front wheel of a carriage has 8 spokes, and the back wheel also has 8 spokes, how many spokes are there in the two wheels together?

By adding together 8 and 8, we find the answer is 16. And, in just the same way as before, we say, instead of 8 and 8, "twice eight" make 16.

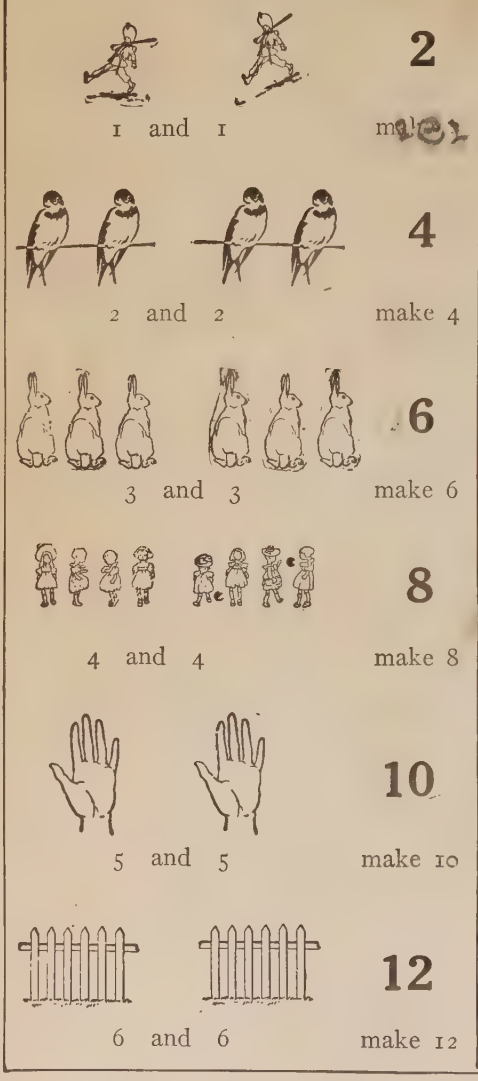
In each of the above examples we had to repeat a given number a certain number of times, and then add them together. If we had worked the examples on paper we should have had to arrange them like these.

4 and 8
4 8
4 —
— 16
12

This process of adding together repetitions of a given number is called

multiplication. If we write the number three times and do the addition, we say that we have "multiplied that number by 3." If we write the number twice and add, we "multiply the number by 2."

By adding 8 spokes of one wheel to 8 spokes of another, we found that of objects. By counting the objects in any set of pictures, we find how many "twice the number in any group" makes. For example, in the fourth picture we have two groups of children. Counting the children in the first group, we say "one, two, three, four"; then going to the second group we say "five,



"twice 8 make 16." In the same sort of way we can find how much twice any other number makes.

Suppose we begin with "twice one," and go on as far as "twice twelve."

On this page are twelve sets of pictures, each set containing two groups six, seven, eight." So we get the result "4 and 4 are 8."

Under each picture is written the answer to the addition sum. But, as we saw at the beginning of the lesson, we call "1 and 1" "twice one"; "2 and 2" we call "twice two," and

so on. If we write down all these results in a column we have:

Twice	*Twice*
1 are 2	7 are 14
2 are 4	8 are 16
3 are 6	9 are 18
4 are 8	10 are 20
5 are 10	11 are 22
6 are 12	12 are 24

This forms what is called a *table*, which means simply a list of results. We must learn this "2 times" table by heart. Of course, the word "twice" (which is only written at the top of the table) must be repeated in every line; so that we say "twice 1 are 2; twice 2 are 4; twice 3 are 6," and so on.

When we know the table perfectly, so that we can answer such a question as: "How many do 7 and 7 make?" quickly and without having to think too long about it, we can go on to the "3 times" table.

To make the table, write down the numbers from 1 to 12, in a column. Next, by the side of this column write down the results of the "2 times" table—that is, say to yourself "twice 1 are 2," and put the 2 down by the side of the 1 in the first column. Then say "twice 2 are 4," and put the 4 down by the 2 in the first column, and so on.

1	2	3
2	4	6
3	6	9
4	8	12
5	10	15
6	12	18
7	14	21
8	16	24
9	18	27
10	20	30
11	22	33
12	24	36

Now add together the two figures which come in each line. 1 and 2 make 3. Put the 3 down at the top of a third column. Next, 2 and 4 make 6.

Put the 6 down under the 3 you have just written. Going on in this way, we get in the third column the figures 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36.

3 times	*3 times*
1 are 3	7 are 21
2 are 6	8 are 24
3 are 9	9 are 27
4 are 12	10 are 30
5 are 15	11 are 33
6 are 18	12 are 36

These are the results in the "3 times" table. We can write it out and learn it in the way we did the "2 times."

ANSWERS TO EXAMPLES ON PAGE 2230.

1	2	3
26002	37259	77951
437	4023	3141
5340	584361	203
78	294	5925
904		64
32761	625937	87284

MUSIC

THE HOMES OF THE LITTLE GOBLINS

WE have talked about the fairies a very great deal, but are you not wondering what the little goblins are doing? In the very first talk we had together we opened our magic kingdom, the piano, and saw a long black line and a long white line. Very quickly we discovered that the white line consists of about fifty little white pieces, where the fairies dwell, and if you have good memories you will remember that we found the black line to be made up of thirty-five black houses, arranged in twos and threes, and in each little black house a goblin dwells.

Such good-hearted little goblins they are! They are always ready to help the pretty fairies; and wonderful friends they prove themselves to be.

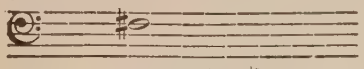
The fairies have their houses so close to the goblins' that it is quite easy for one to help the other. Supposing Fairy F wants to go out for a little while, it might be very difficult for her to do so, because in our magic kingdom no one is ever refused. Fairies always answer truly and sweetly if only we approach their notes carefully. This being so, we can quite well see that the fairies would think it a grave breach of good manners if anyone called on Fairy F and no answer came. So what can the little fairies do when they want to have a little holiday?

The secret was whispered in the world a long time ago; it traveled down the ages to me, and now I will tell it to you. The fairy goes to the little black note next door to her, on the right-hand side; she tells the little goblin who lives there how very much she wants a holiday, and asks him if he will be so very kind

as to answer any visitors who call. The little goblin smiles, and tells her how happy he is to be able to help her. "Thank you, dear goblin," replies the little fairy. "I shall lend you my name for all the time I am away, and you must carry a flag which I now give to you. It is known as the little *sharp*. Everyone knows that it is the sign carried by a kind little goblin who is keeping house for the wee fairy immediately next door to him, on his left-hand side. And because your voice is just a very little higher than mine, and you take my place so sharply, I will give you my name."

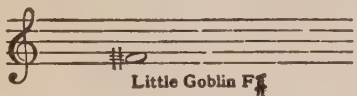
Little Goblin A♯

Very proud is the little goblin that he can really help the fairy; very happy is the fairy because she has so kind a friend. You and I will go to Fairy F's note on the fourth line in the Bass Road, and we shall find her little goblin hanging the small flag on the same fourth line. So, instead of pressing little F's white note, we shall go to the black note immediately above her on the right-hand side.



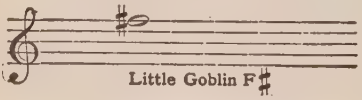
Little Goblin F♯

Now we will pay a visit to Fairy F's note between the first and second lines in the Treble Road, to find Goblin F-sharp on her right:



Little Goblin F♯

but, if you notice as quickly as I am sure you will, you will see that while he lives on the right-hand side, when the photograph is taken his banner appears on the left side. It is one of those funny things that happen in fairyland, and one which we must be wide awake enough never to forget.

Once again we must find Fairy F's note on the fifth line in the Treble Road, and, sure enough, there is the dear friendly little goblin on her right.

Little Goblin F♯

Wherever Fairy F has a home, there on the right is little Goblin F-sharp ready to sing for her, whenever she wants his bright little voice, but we must always remember that his voice is a little higher, or *sharper*, than the voice of the fairy he is representing.

Has Fairy C a little C-sharp goblin, too? Certainly she has. We will find all the little notes belonging to her, and at the right-hand side of each one we shall see there is a wee goblin's house, and know that good, kind Goblin C-sharp is ready and waiting to help. Fairy G's little goblin lives exactly next door on her right; Fairy D is as happy as can be, because her goblin, D-sharp, is immediately next to her, and for the same reason Fairy A feels quite safe, knowing she can have a holiday when she wants one, for her little goblin, A-sharp, is ready to unfurl his banner and sing.

You will be surprized to know that Fairy B and Fairy E have no little goblin living immediately on their right. Look on the piano, and you will see that, as Fairy B's house joins Fairy C's, there is no room for a little black house, and Fairy E is in the same fix, for her house is the very next to Fairy F's, so what can these poor fairies do when they want a holiday?

The goblins' flag

Well, as we know, in this magic land everyone tries to be kind to everyone else, and so Fairy C comes to poor little Fairy B, and says, "If you will give me the little sharp flag, and let me bear your name, I will quite forget myself as long as you need me, and during that time everyone will call me "little B-sharp."

Little Goblin B♯

The same kind offer was made to little E by Fairy F, and she, too, forgets herself, takes Fairy E's place, and carries little E-sharp's banner.

Little Goblin E♯

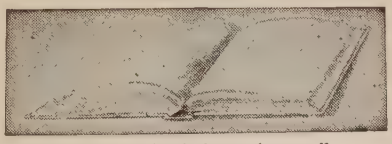
HOW TO DRAW AN OPEN BOOK

BY this time we know quite well how to draw easy things in black and white chalk. An open book is not an easy thing, but it is interesting, and we can learn now to draw it in chalk or in pencil—or with both if we like. We must have white drawing-paper and our pencils ready, in any case, because there are some things to learn for which we shall want to make some little pencil sketches first.

We have learnt how things alter their shape when they are moved nearer to or further from the eye, but there is still more for us to know about this. If we keep our heads quite straight, and our eyes too, and look at the wall exactly opposite us, there will be a point on the wall on a level with our eyes, and we can only see a small distance all round this point, so that some things on the wall are out of sight unless, of course, we turn our eyes towards them. This point on the eye-level is the point of sight. Do you remember how we found that the top of a jam-jar seemed to get wider as it was moved away from the eye-level, up or down?

The dotted lines show us how to begin the book. Then the other lines may be filled in.

We only drew the square box in another lesson in one position—exactly opposite to us; but we are going to draw the book a little way on the left, so that we can see the front and the right-hand edges. It will be easier to try this position with a sheet of white paper first. Take another piece of paper to draw upon, and use the blunt-pointed pencil.



The open book drawn in pencil.

Let us put the sheet of paper opposite to us first—that is easy to draw. The back line will be shorter than the front, so that the two other sides must slant. Lines like these below the eye slant upwards to the eye-level.

Now we will try with the paper on the right-hand side. We will draw the line nearest to us first, then the back line, shorter than the front; the little side lines slant upwards towards that point on the wall which is level with the eye. One side has further to go—the side furthest away from us—so it must slant more than the side nearest to us.

Why do we make slanting sides to a sheet of paper which has all its sides quite straight? It is because our eyes make them look slanting when the paper lies flat. If we made the lines all straight the paper would look as if it were standing on its edge.

Things opposite to us get smaller as they are pushed further off, and things on our right or left hand alter and get smaller, too, till they disappear quite out of sight. Now we will try to draw the sheet of paper on the left-hand side, and if we like we can make sheets of paper with white chalk on brown paper before we begin the book. Let us choose a good thick book, and one in which the pages will turn over easily and lie down when the book is opened. We will put it in front of us on the left-hand side, some distance away, and then with black and white chalk or pencil we will draw lightly and carefully the general shape of the part of the book lying on the table—not the thickness of the leaves or the binding yet; just a single outline as we drew the sheet of paper, only the centre of the book must be drawn, too. The side nearest to us will slant a little, the centre line will slant more, and the one furthest away will slant most. All these lines slanting upwards, they would meet in the point on the eye-level if we lengthened them so far.

If this part is nicely drawn the rest is easy. We can then put in the thickness of the binding and the leaves, showing this only in front and on one side—we cannot see the other side—and then try putting in the shadow softly with the flat side of the pencil point. If we make shadow we must not let the outline show, but make it all one color with the shadow. If we work in chalk we can put in the whiter part with white chalk, the darker with black, and the others with white used thinly.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

La bonne dit à maman que Jeannette a besoin de bottines neuves.
The nurse says to mamma that Jenny has need of boots new.
Nurse tells mamma that Jenny needs new boots.

Maman lui dit de nous prendre au magasin pour en acheter.
Mamma to her says of us to take to the shop for of them to buy.
Mamma tells her to take us to the shop to buy them.

Nous sortons après le déjeuner. Nous sommes impatients de voir les magasins.
We set out after the lunch. We are impatient of to see the shops.
After lunch we set out. We are anxious to see the shops.

Nous entrons dans un magasin et la bonne dit: "Je désire voir des bottines."
We enter in a shop and the nurse says: "I desire to see some boots."
We go into a shop and nurse says: "I wish to see some boots."

Le commis nous en montre une paire, mais elles sont trop serrées.
The shopman to us of them shows a pair, but they are too tight.
The shopman shows us a pair, but they are too tight.

Le commis en apporte des autres et Jeannette tend son pied.
The shopman of them brings some others and Jenny tenders her foot.
The shopman brings some others and Jenny holds out her foot.

Tout à coup elle crie: "Regardez! La petite souris!" Elle a peur.
All at (a) blow she cries: "Regard! The little mouse!" She has fear.
Suddenly she cries out: "Look! There is a little mouse!" She is afraid.

La petite souris saute par-dessus la bottine et court derrière des boîtes.
The little mouse jumps by over the boot and runs behind some boxes.
The little mouse jumps over the boot and runs behind some boxes.

Nous éclatons de rire. Je pense que les filles sont très sottes.
We burst of to laugh. I think that the girls are very silly.
We burst out laughing. I think girls are very silly.

Enfin Jeannete choisit de jolies bottines, et la bonne paye la note.
At last Jenny chooses of pretty boots, and the nurse pays the bill.
At last Jenny chooses some pretty boots, and nurse pays the bill.

THE NEXT SCHOOL LESSONS BEGIN ON PAGE 2691.

The sky-line of New York, showing the height of some of its wonderful buildings.

THE UNITED NATION

PART I

WE told in our last story of the quarrels between President Johnson and Congress, and of the failure of the attempt to drive the president from his high office. As the end of his term drew near, it was certain that the Republican party would nominate General Grant for the presidency. This was done and he was elected by a great majority in 1868, and re-elected in 1872.

CONTINUED FROM 2160

Eight of the seceding states had been restored to the Union during Johnson's administration, but one of them, Georgia, had been put back under military rule. In 1870 this state and Virginia, Mississippi and Texas were all recognized as members of the Union. All the states were now in the Union, but conditions in some of the Southern states remained very bad for many years longer.

The Fifteenth Amendment, which forbade the states to deny negroes the right to vote, became a part of the Constitution during President Grant's first term, and some of the railroads across the continent were finished. Population in the West increased very rapidly as the railroads were pushed across the plains. In 1873, there came a period of hard times, during which many banks and manufacturing establishments failed, and business was very dull.

One of the most important events of the time was the Centennial Exposition at Philadelphia in 1876, to mark the century since the Declaration of Independence. It was the first of the great expositions held in the United States, and the exhibits from our own country and from Europe were finer than had ever been seen. People from all parts of the country attended, and saw many things of which they had only heard before.

A DISPUTED ELECTION CAUSES GREAT ALARM

At the election of 1876, both the Democratic candidate, Samuel J. Tilden, of New York, and the Republican, Rutherford B. Hayes, of Ohio, claimed to have been chosen. It was very hard to know who had been really elected. In one of the Southern states there were two governments, each claiming to be the right one. In other states there were many charges of fraud, and many laws had not been obeyed. The time for the new president to take

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office was coming and no one could say which of the two candidates was entitled to the office. So a special court, called an Electoral Commission, was formed and decided in favor of Hayes, who took his seat, but many people believe to this day that Tilden was rightfully elected.

During this administration all United States soldiers were called back from the Southern states, which were allowed to govern themselves. As soon as the soldiers were gone, the "carpetbaggers" and negroes lost all power.

Though President Hayes was in many ways a good president, the charge that the office really did not belong to him had some effect on his popularity. In 1880, another Ohio man was chosen, though many people had tried to get a third Republican nomination of General Grant. The new president, James A. Garfield, had been a poor boy who had struggled hard for an education. Once he drove the teams which pulled the boats on the Ohio Canal, and afterward worked his way through school and college.

President Garfield had been in office only a few months when he was shot by a man who had become half-insane because of disappointment at not receiving an office. Vice-President Chester A. Arthur, of New York, became president and served the remainder of the term. He was a good president and the country was very prosperous while he was in office.

THE FIRST DEMOCRATIC PRESIDENT SINCE THE WAR

At the election in 1884, Grover Cleveland, then Governor of New York, was chosen. President Cleveland was a Democrat and was the first president of that party since James Buchanan. For twenty-four years every president had been a Republican. But the Democratic party did not have entire control of the government, as during the four years a majority of the senators were Republicans. During this term there were great strikes in different parts of the country. A "strike" is the refusal of men to work longer for their employer. The railway strike in Chicago was so serious that President Cleveland called out United States soldiers to protect lives and property.

After the end of the Civil War, the wooden ships of the navy had been allowed to rot, and the monitors, as the iron ships were called after the first one, had rusted away. The country had no navy worth mentioning when Cleveland became president. During his term we began to build modern warships and have continued until now our navy is one of the strongest in the world.

Mr. Cleveland was again a candidate in 1888, but was defeated by Benjamin Harrison, of Indiana, a grandson of President William Henry Harrison. The tariff was greatly increased during his administration and six states were admitted to the Union. There was much talk about coining more silver into dollars, and a law was passed which allowed this.

Though President Harrison was a man of great ability, he did not make friends easily and was not very popular with his own party. He was a candidate for re-election in 1892, but Cleveland was again elected. He is the only president in our history who has served two terms not in succession.

A GREAT EXPOSITION HELD IN CHICAGO

A celebration of the four hundredth year since the discovery of America by Columbus took place in Chicago in 1893, as the buildings could not be gotten ready in 1892. This World's Fair, as it was called, was the most wonderful collection of the manufactures and products of the world that had ever been seen.

Times were very bad during President Cleveland's second term, and there were many strikes. The farmers in the South and West thought that the laws were more favorable to the manufacturers than to those who worked on the land, and demanded many new laws. His own party did not support President Cleveland, and nominated William J. Bryan, of Nebraska, and he received the support of the farmers' party also.

When the election arrived the Republican candidate, William McKinley, another Ohio man, was chosen. The most important event of his administration was the Spanish War, of which you are told in another volume. President McKinley was re-elected in 1900, but only a few months after his second term began, he was shot by an anarchist, while in Buffalo, New York, attending another exposition, and soon died.

The vice-president, Theodore Roosevelt, became president and finished the term, and was himself elected for a full

MAKING THE DESERT BLOSSOM AS THE ROSE

Here we see the wonderful results of the energy of the people of the great West. In their advance across a vast continent they came to arid deserts like that in the top picture, on which rain rarely falls. They set to work, however, bored wells, and dug waterways to fetch water from the distant mountains and rivers. This water they guided into a vast network of irrigation channels, and made the desert soil so fertile that to-day, after forty years, we see such luxuriant orange-groves as in the bottom picture. In the centre picture we see water flowing from a well into an irrigation channel, and so the want of rain does not matter at all to these busy people.

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term in 1904. Mr. Roosevelt was one of the most active presidents the country has ever had. He started the work on the Panama Canal, had a pure food and drug law passed, and did much to bring water to the dry lands in the West. Through his influence Japan and Russia agreed to stop fighting. When the Cubans began to quarrel among themselves he sent an army to preserve order. He visited all parts of the country to make speeches, went to see how the work was being done on the Panama Canal, and took great interest in everything. At the end of his term he spent more than a year hunting in Africa and told of his adventures in a large book.

OHIO THE NEW "MOTHER OF THE PRESIDENTS"

Mr. Roosevelt was succeeded by William H. Taft, of Ohio. That state seems to be likely to take away the title, "Mother of the Presidents," from Virginia, as so many of our recent presidents have been elected from Ohio. Mr. Taft had had much experience in government. He was the first governor of the Philippines, served as Secretary of War, and when the United States sent the second army to Cuba, took charge of the government until the island was quiet again.

President Taft did not have a happy time as president. The Republican party was divided on the tariff, and other questions, and the President could not please either side. When Ex-President Roosevelt came back from Africa he began to take great interest in politics and tried to get the Republican nomination in 1912. He failed and his friends organized the new Progressive party and nominated him for president. The old friends now opposed each other and divided the Republican party so that the Democratic candidate was chosen.

THE UNITED STATES IN OUR OWN DAY

In the election, Woodrow Wilson, Governor of New Jersey, was chosen, and was inaugurated March 4, 1913. President Wilson had been a college professor, and was president of Princeton University when chosen governor of New Jersey. Like President Cleveland he had had very little political experience, but congress passed many bills he recommended.

During President Wilson's first term, for he was re-elected in 1916, a new tariff bill was passed, and many changes were made in the laws about money and banking. The Panama Canal was completed and we almost had a war with Mexico as that country was in a state of revolution and American citizens were abused and even killed.

The Great War in Europe broke out and though President Wilson succeeded in keeping the United States out of the conflict for more than two years, war was declared against the German Empire, April 6, 1917, and later against the Austrian Empire. During this year three small islands in the West Indies, St. Thomas, St. Croix and St. John, were bought from Denmark for $25,000,000.

Many men were called to enter the army and navy, and very soon uniforms were seen in every town and city. Real cities were built to shelter the soldiers while they were drilling before going across the ocean. American naval vessels soon went across the water to hunt submarines, or to guard the ships carrying soldiers or food and military supplies. Two million men went across the ocean, and as many more were ready to go when the Germans asked for peace in 1918.

President Wilson was a strong advocate of a League of Nations and attended the Peace Conference in Paris to work for the idea. Many men in the United States were opposed, and the President's ill health caused some confusion. At the election in 1920 the Republican candidate, Senator Warren G. Harding, was chosen the twenty-eighth President by a large majority.

President Harding had to consider many problems growing out of the Great War, and worked very hard to settle them. His health was injured by overwork, and August 2, 1923, he died while on a tour of the West. He was succeeded by the Vice-President, Calvin Coolidge, who was governor of Massachusetts at the time of his election to the vice-presidency. In 1924 Mr. Coolidge was elected for a full term.

VICE-PRESIDENTS WHO SUCCEEDED TO THE OFFICE OF PRESIDENT

Though twenty-nine men have been president, only twenty-four were elected to the office. Six vice-presidents have become presidents because of the death of the man elected. These were John Tyler, who succeeded William Henry

LOOKING DOWN A NEW YORK STREET

New York, chief port of the United States, is built on a narrow island. This means that as the city grew there was not as much room as people needed for building. So, instead of spreading buildings over the ground, they have been built high in the air, until the business part of New York is now largely a city of "skyscrapers," as we usually call them. Broadway, shown in this picture, is one of the principal streets in New York, and is like no other street in the world. A great part of it is like a deep ravine, lined on each side with buildings from ten to more than thirty stories high, and at some points the sun seldom reaches the level of the street.

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Harrison after only one month of the term had gone; Millard Fillmore, who succeeded General Taylor; Andrew Johnson, who filled out the greater part of Lincoln's second term; Chester A. Arthur, who succeeded Garfield; Theodore Roosevelt, who completed McKinley's second term; and Calvin Coolidge, who succeeded Harding. Mr. Roosevelt and Mr. Coolidge are the only ones of the six who were afterward elected to the office.

One fact which we must consider with shame is that three of our presidents were assassinated within forty years. It seems horrible that such a thing should occur in a free country, where every one has a voice in the government, and where there is no chance of a president becoming a tyrant.

Of all our presidents ten have been twice elected, though Lincoln and McKinley did not fill out their second terms. Cleveland was elected, then defeated, and then elected again.

Where our presidents lived

All of our presidents were born east of the Mississippi River and most of them have come from a few states. Five came from Virginia. These were Washington, Jefferson, Madison, Monroe and Tyler, but three others, William Henry Harrison, Zachary Taylor, and Woodrow Wilson, were born there. Ohio has furnished six, W. H. Harrison, Hayes, Garfield, McKinley, Taft and Harding. All these except W. H. Harrison were born in the state, and Grant, and Benjamin Harrison, though elected from other states were born in Ohio. Five lived in New York, Van Buren, Fillmore, Arthur, Cleveland and Roosevelt, but Arthur was born in Vermont and Cleveland in New Jersey. Three lived in Tennessee, Jackson, Polk and Johnson, all born in North Carolina. Massachusetts has had three, John Adams and John Quincy Adams, father and son, and Calvin Coolidge. Illinois has had two, Lincoln and Grant, but Lincoln was born in Kentucky and Grant, as we said above, in Ohio; Louisiana had one, Taylor; New Hampshire had Pierce, and Pennsylvania had Buchanan. Indiana was the home of Benjamin Harrison and New Jersey of Woodrow Wilson.

The West is growing so rapidly in population, wealth and influence, that before many years we may expect to see a president elected from the region beyond the Mississippi, and perhaps one from west of the Rocky Mountains.

Some facts about this country of ours

We have now told something of the story of our country. Now let us look about us and learn something of the country itself, the people, and the products of the country. We know that the population is very great, and we shall try to find out where the people live and how they make their livings.

Not counting our foreign possessions the United States proper extends over more than 3,000,000 square miles. This means that the United States is larger than all the countries of Europe taken together except Russia. Several single states are larger than most of the countries of Europe and Texas is larger than any of them except Russia.

In addition we must count Alaska, nearly 591,000 square miles, the Philippines with 120,000, Hawaii, 6,449, Porto Rico, 3,435, and many smaller islands in many seas. In all, the outlying territory of the United States amounts to about 725,000 square miles. We have already told you of this in another place and shall not say more about it now.

Every ten years the government takes the census. The number, residences, and occupations of the people, their religion, the kinds of property they own, the crops they have raised, the goods they have made, and many other things are all put down and afterwards published in large volumes. From them we can learn many interesting things, for figures are not dull if we understand what they mean.

What the census shows of the growth of our country

The census of 1920 showed that there were in the United States proper, on January 1st of that year, more than one hundred and five and a half million people living. If to these we add the population of Alaska and our island possessions, the number goes beyond 117,000,000. The first census was taken in 1790, a hundred and thirty years before that of 1920. Then the population was about 4,000,000. This shows a wonderful growth.

The state with the largest population is, as might be supposed, New York, which had 10,384,829, a larger number than many nations have. Pennsylvania is next with 8,720,017, an increase of over

TWO THRIVING WESTERN CITIES

Portland, Oregon, is a western city which has grown like magic. It is beautifully located at the point where the Willamette River joins the Columbia. It has an excellent harbor which will accommodate the large ships that come to take away some of the many things manufactured in the busy city. The railroad connections are excellent. This is the Broadway bridge over the Willamette, raised to let a ship pass.

The city of Reno, Nevada, is situated on the Truckee River and is the largest town in the state. It is the educational, business, and industrial centre of the state. The University of Nevada is here, and several other schools. There is considerable manufacturing and the country around is rich in minerals. Much of the land is irrigated and produces large crops. Many cattle are also raised. It has several railroads.

a million. The state with the smallest population is Nevada, which had only 81,875 people in 1910, and ten years later only 77,407. This state ought not to have been admitted when it was because of its scanty population. Much land in this state is not suitable for agriculture, but irrigation is making much of it fertile and the state may yet support a large population.

The largest city is New York, with 4,800,000 people in 1910, and 5,620,000 in 1920, which makes it the largest city under one government in the world. Chicago has now over 2,700,000, and Philadelphia, with more than 1,800,000, ranks next in size, and these three are among the ten largest cities in the world.

VARIETIES OF SOIL AND CLIMATE IN THE UNITED STATES

Within the United States is almost every kind of soil and climate. On the rocky hillsides in Maine and New Hampshire very small crops are raised, while the broad prairies of the Mississippi Valley, and the lowlands along the seacoast and rivers, have some of the richest land in the world. Somewhere in the vast extent is soil which suits almost every crop.

In the most northern sections, the winters are long and the summers short, and only the crops which grow very rapidly can be raised. In the far South, in Florida, Louisiana, Texas and Southern California, it seems always summer. In some parts of the country, there is almost constant rain at some times in the year. In other parts rain seldom falls.

There are real deserts to be found, though they produce good crops when water is furnished. In other parts much land has been reclaimed from the sea or from the rivers, just as we know has been done in Holland and Belgium. Much land along the lower part of the Mississippi, and the rivers which flow into it, is lower than the river, and great banks of earth called levees keep the water back from the land.

CORN, THE MOST VALUABLE CROP WE RAISE

Corn is the most valuable crop produced in the United States. We grow three-fourths of the world's supply of this wonderful grain, which is so valuable for human food, as well as for horses, cattle and hogs. The dry stalks also make valuable food for horses and cattle. While still green the stalks and leaves are often chopped into short pieces and packed tightly in a great tank called a silo. The moisture does not dry out of the pieces, and animals like this ensilage, or silage, as it is often called, much better than the dry. There is no more beautiful sight than a great field of waving corn.

Corn will grow in nearly every part of the United States, but the states of the Middle West grow most, though the largest crop ever grown upon a single acre was produced by a member of a Boys' Corn Club in South Carolina. Many boys in the United States are members of such clubs, and try to raise as many bushels as possible.

The next crop in value in most years is hay, though little of this is sent abroad. Many grasses are dried to make this crop. Some grow wild without care and what is gained from them is almost entirely profit. In other sections the seed is sown though not every year. Several kinds of clover, timothy, red top, orchard grass, blue grass and alfalfa, are some of the plants used for hay. The vines of several sorts of peas and beans make good hay when cured properly.

COTTON, A CROP WHICH THE WORLD MUST HAVE

The crop for which the world is most dependent upon us is cotton. In no other country can cotton be grown so easily as in our Southern states, and though we have many busy factories, both in the North and in the South, much more than half of the crop is sent abroad. Egypt and India grow cotton also, but there is not land enough in Egypt, and in India the climate does not allow the best kinds to grow. If a machine to pick the cotton in the fields could be invented, the United States could easily supply the whole world.

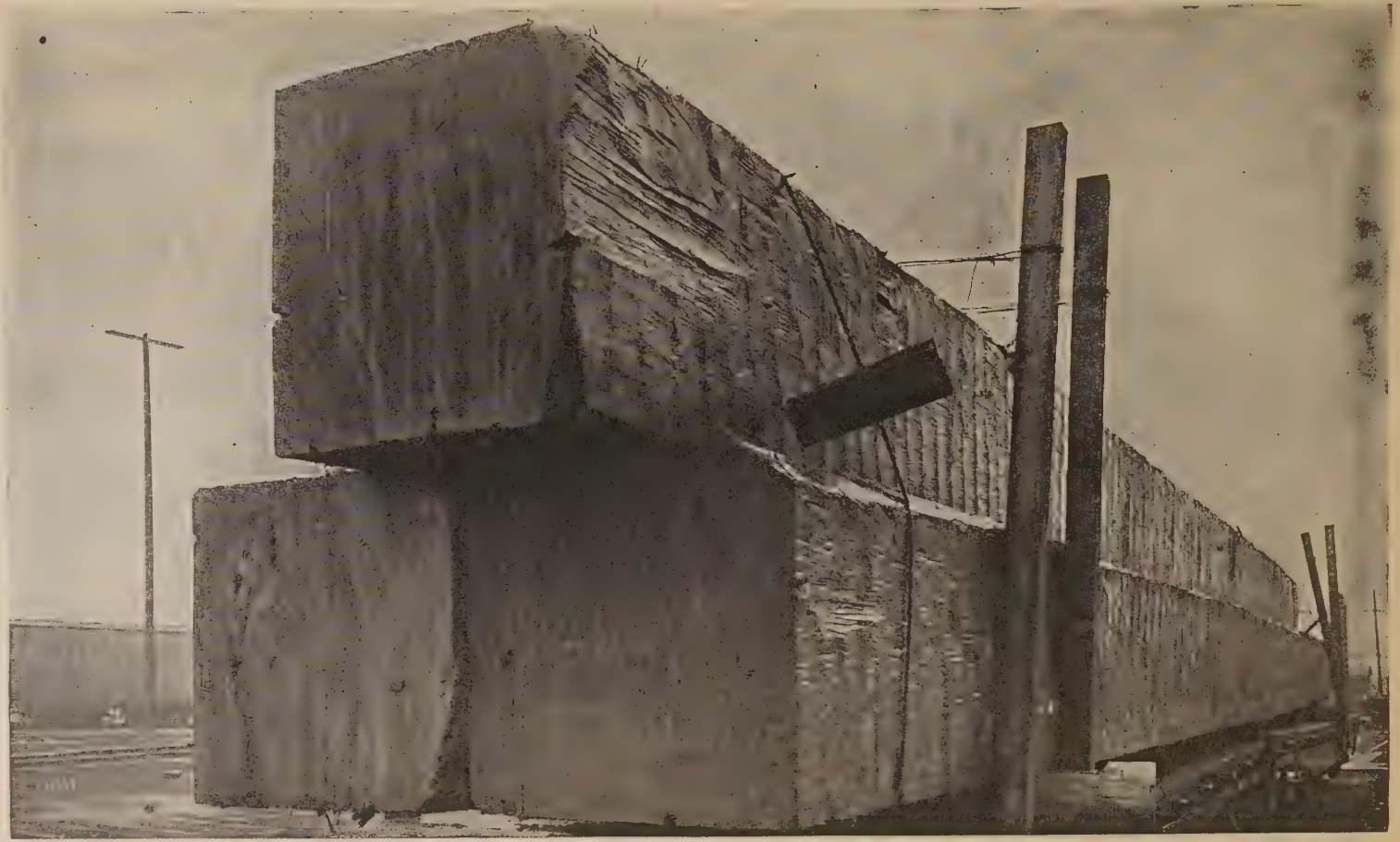
Other nations have tried to develop cotton growing in different parts of South America, Asia and Africa, but have not succeeded very well. Soil, climate and labor must all be suited to the plant, and all these are seldom found together. The United States will be the chief cotton-growing country for a long time. The sea island cotton, which has very long fibres, which are almost as fine as silk, is grown only in the United States.

MILLIONS OF DOLLARS ONCE THROWN AWAY

Only a few years ago the seeds of the cotton were considered a great nuisance

LOGS OF THE DOUGLAS FIR ON THE WAY TO THE MILL

2385



The Douglas fir, or Douglas spruce, is one of the most valuable trees on the Pacific Coast. It sometimes reaches a height of three hundred feet, and a diameter of ten to twelve feet. The timber has a straight grain and is very strong. Many trees are cut every year. Here you see some of the logs on railway cars on the way to the mills.

and were thrown away. Now they are ground, the oil is pressed out, and what is left is used for a fertilizer or for food for cattle. The hulls also are fed to cattle. The oil is used for many purposes, and some dishonest dealers put false labels on the bottles and sell them as olive oil. Altogether the value of the products of the cotton seed, once thrown away, amount to more than $150,000,000 a year.

Our next crop in value is wheat, of which we usually grow about a fifth of all grown in the world. Some wheat is grown in most of the states, but it is in the newer states of the Gulf Slope, of which you were told in the first volume, that the largest fields are to be found. We have been using over four-fifths of our crop ourselves, and sending the remainder to help feed hungry Europe, but if our population continues to increase so rapidly, we shall not have much to spare before many more years have gone. Great wheat fields are being developed in Canada and in the Argentine Republic, however. During the Great War we raised and shipped much more than the regular crops.

The United States grows more than any other single country because so much land is devoted to wheat. The European countries generally grow more bushels to an acre, but they cannot plant so many acres. In some states wheat is sown in the fall and is ripe in the early summer. In other states it is sown in the spring and is reaped in the late summer or early fall. North Dakota, Minnesota and Kansas, in the order named, usually grow the most wheat, but several other states are not far behind.

Other important crops grown in our country

Our next important crop is oats, of which we grow a great quantity. Perhaps you have oatmeal for breakfast every morning, but the horses get much more than you do.

The next crop is also one not much of which is sent abroad. This is the white or Irish potato, and the crop is worth millions of dollars a year. We also grow great quantities of sweet potatoes, but they are nearly all eaten in this country. The white potato is chiefly grown in Northern states and the sweet potato in the South.

The next crop in value is one with which boys and girls have nothing to do. This is tobacco, of which we grow more than a third of the world's supply. Some of the factories which prepare this plant are very large and employ thousands of men, women and children. This is a luxury, but it is one men will go without many necessities to gain.

Next we come to sugar. We use more than any other people of this, one student says, eighty-five pounds a year for every man, woman and child. We cannot begin to raise all we need, though we grow sugar-cane in the South, sugar-beets further north, and get a little maple sugar from several states. We get much sugar from Cuba, Hawaii, and usually get some from Europe.

These are only a few of the crops we raise, but they are the principal ones. We raise in the Southern states almost all the rice we use and the amount of flax raised for its seeds is large. Linseed oil, used in painting, is made from flax seeds. We grow rye, barley, buckwheat and many kinds of fruit and vegetables. In California and Florida, oranges, pineapples and other tropical fruits are grown, while apples, peaches and pears grow in many parts of the country. We are beginning to send some of our fruits abroad, as it is possible, by packing them in ice, to deliver them in good order, thousands of miles away. California leads in the value of its fruits, with New York next. Michigan and Pennsylvania also grow large quantities. Florida is second to California in tropical fruits.

One important crop which we almost omitted

There is another crop which we must mention. Probably you have never considered it a crop at all, but it is as truly a crop as hay. The chief difference is that it takes longer to grow. The crop is trees, and the product is wood or lumber. Land will yield a crop of hay every year, or perhaps several crops. A crop of trees takes twenty, forty, a hundred years to grow. Both hay and trees grow wild, and both are also cultivated.

When our ancestors came to this country, much of it was covered with trees. The earliest descriptions and pictures of Manhattan Island show us that it was once covered with a great forest. So was most of New England and the whole Atlantic Slope in fact. A part of the Mississippi Valley had no trees, but was covered with waving grass. This is the

prairie region, of which you have heard, and there are more trees in it now than there were a hundred years ago. There were, however, great forests about the Great Lakes, in the Rocky Mountains, and on the Pacific Coast.

In another place we shall tell you how these great forests were cut down and how much of the wood was wasted, because people thought there was enough to last for ever. We are even now cutting down our trees more than three times as fast as they grow, and soon they will be gone unless men plant trees in great numbers. Think what uses we make of trees and their products, and you will see how difficult it will be to find something to take the place of wood.

We use wood to burn, to build houses, for furniture, for railway ties, for bridges, for boxes, pails and other containers, for vehicles. In fact we cannot name all the things that are made of wood. The trees from thousands of acres are required by the paper mills alone every year.

The value of the timber products of the state of Washington is greater than that of any other state. New York stands second and Louisiana third. A few years ago Michigan and Wisconsin led in this product, but so much was recklessly cut away that these states ranked fourth and fifth in 1910. In Washington much spruce is cut, and the Douglas spruce or Douglas fir furnishes some wonderful logs. Much hard wood is cut in the Southern mountains, and much pine in the low country, and Louisiana furnishes much cypress.

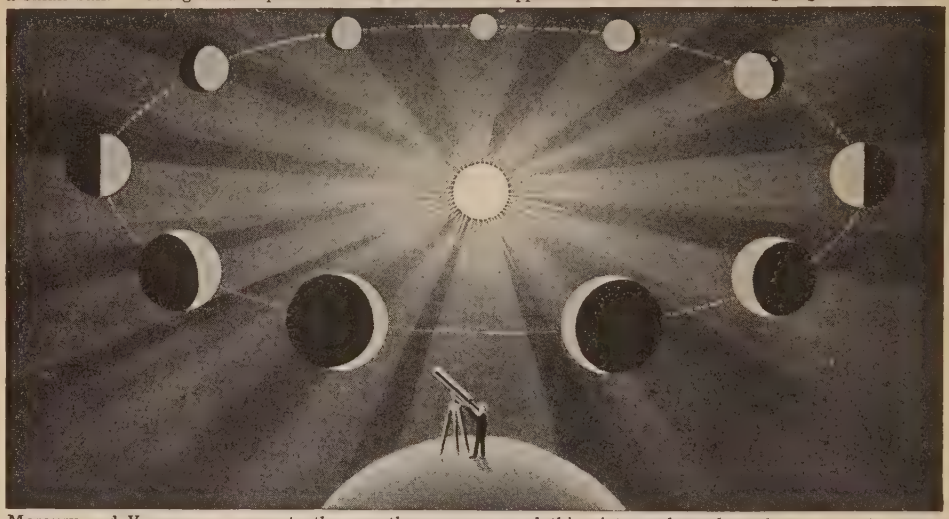
In our next article we shall tell you more about this wonderful country of ours. In it we shall speak of the mineral products and of the manufactures which are so important. As you see, we have been telling you only of the things which grow out of the ground and are called vegetable products. We shall also tell you something of the people who now live in the United States.

The apples grown in the valley of the Hood River, in Oregon, have made the district known everywhere. This is an apple orchard in full bloom and is a sight worth going miles to see. Delicious pears and strawberries are also grown. A ring of mountains surrounds the little valley, and Mt. Hood is not far away.

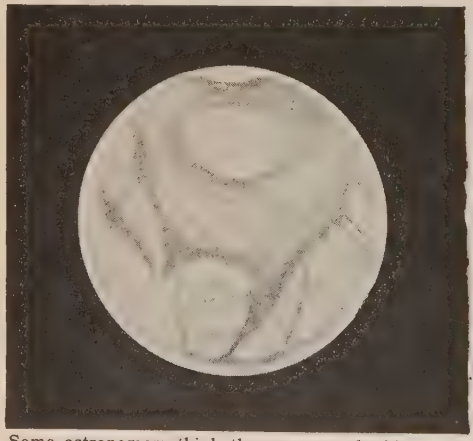
THE NEXT STORY OF THE UNITED STATES IS ON PAGE 2677.

OTHER WORLDS AS SEEN FROM THE EARTH

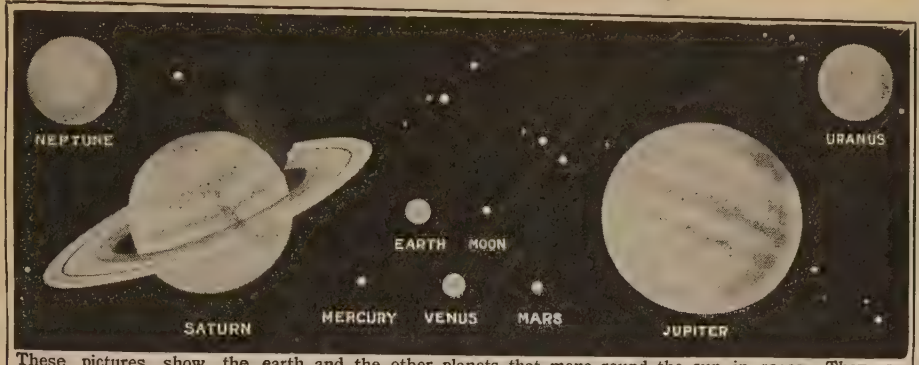
Like the moon, Mercury and Venus are always changing their appearance to us, but this can only be seen through a telescope. The left-hand picture shows Mercury. It looks like a crescent when nearest the earth, and as more of it comes into our view it gets smaller, until we see the whole planet at its farthest distance as a small ball. The right-hand picture shows the different appearances of Venus as seen going round the sun.



Mercury and Venus are nearer to the sun than we are, and this picture shows how they appear from the earth, and why at different times their shape varies. When the sun shines full on the side we see, the planets are farthest away and appear small, but when we see a crescent of light they are nearer and appear bigger.



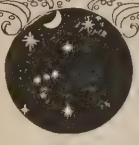
Some astronomers think they can see double canals on Mars, while others say this is a false appearance caused by the telescope, and that the canals are single. In the left-hand picture the canals are shown double, and at the top is the South Pole of Mars, white with ice. The dark funnel-shaped part is thought by some to be sea. The right-hand picture shows the same half of Mars tilted up more, showing the North Pole, which is the white patch at the bottom. Here the canals are shown single, as many astronomers think they are.



These pictures show the earth and the other planets that move round the sun in space, They are shown here in their comparative sizes; Jupiter is twelve hundred times as big as the earth.

THE SUN'S FAMILY OF WORLDS

CONTINUED FROM 2297



WE must now study the other planets of the solar system. There is now probably no doubt that the innermost planet is Mercury, and that a planet going round the sun still closer than Mercury does not really exist, though some astronomers have thought that they had seen it. It may be that in the future astronomers may discover that those were right who thought they saw the planet which they called Vulcan; but for us, at any rate, the innermost planet is Mercury. Its discovery goes back a very long way. Indeed, though Mercury is by no means easy to see, and though such a mighty astronomer as Copernicus, for instance, never saw it, yet we know that, so far back as the records of astronomy go at all, Mercury was already known.

If we little people are more fortunate than Copernicus, and get a view of Mercury, we shall probably see the planet as a crescent, or, at any rate, as very like one or other appearance of the moon. This, we understand at once, must be the case with both Mercury and Venus, as these are planets very like the earth or the moon or Mars, in that none of them can shine of themselves, but can only reflect the sun's light. As Mercury goes round the sun, one half of the planet is always lit up by the sun's light, and what we see of Mercury or Venus, as in the case of the moon, entirely depends upon how much we can see of the half of the planet that is turned towards the sun. I am afraid we know really nothing yet as to what the surface of Mercury is like. This is not due so much to the fact that Mercury is small, as to the fact that it is so bright—because, of course, it is very near the sun. Indeed, Mercury is so bright that with the naked eye we cannot see its shape at all, and even through the telescope it glitters too much for us to make out any features of its surface. The temperature of Mercury must, however, be so hot that nothing at all like life, as we know it, can be possible there *yet;* and so it matters little that we know nothing about Mercury's surface.

We do know, however, certain very interesting facts about Mercury. The planet is not very large, but is larger than the moon. It is very easy to remember that the diameter of Mercury is just under 3,000 miles. It has also been shown that the planet is very heavy in proportion to its size; or, in other words, it is very dense. The density of Mercury is considerably greater than that of the earth, and it is the densest of all

the planets. The year of Mercury is just about 88 of our days; or we may say that Mercury goes right round the sun in what we call about three months.

We know that all the planets move round the sun, not in circles, but in the kind of path which is called an ellipse. This is true of all the planets, and it depends upon the law of gravitation. But as a rule the path of a planet, though an ellipse, is so very nearly a circle that we might almost call it a circle unless we studied it very carefully.

THE PLANET MERCURY, WHERE THE YEAR IS ONLY THREE MONTHS LONG

Mercury, however, is peculiar because its path is very much more elliptical, or more this shape, O, than that of any of the other planets, including, of course, the earth. The average distance, or, as astronomers say, the *mean* distance, of Mercury from the sun is about 35,000,000 miles, but its path is so elliptical that the least distance of the planet from the sun is only about 28,500,000 miles, and its greatest over 43,000,000. Mercury is very near the sun in any case, and so must always be very hot. But these differences of distance are so great, and succeed each other so quickly—for the planet's year is only three months—that it is impossible to imagine how any kind of life could endure there.

We are now able to say that the planet has an atmosphere, and perhaps a very dense one. It probably rotates upon its axis, and there is some reason to believe that this rotation takes just as long as the planet takes to go round the sun, thus offering something very similar to what we saw in the case of the moon.

It is not possible to learn much about the composition of Mercury, for the light we see it by is only sunlight, reflected from its atmosphere, and tells us little. But there is not much doubt that Mercury has water in its atmosphere; we believe that it has no moon.

THE BRIGHT WORLD THAT TRAVELS BETWEEN MERCURY AND OURSELVES

The planet Venus travels between Mercury and ourselves, and so this planet also appears to us in phases like the moon and Mercury. The planet is much larger than Mercury, its diameter being not very much less than that of the earth, say, 7,760 miles as compared with nearly 8,000. The nearness of the planet to the sun—its average distance is about 66,000,000 miles—gives it its great brilliance—brilliance entirely due to sunlight, of course. Venus is brighter than Jupiter, though Jupiter is vastly larger, and gives out some light of his own besides reflecting sunlight. But when we make these comparisons we are always thinking of how things look from the earth. We should remember, then, that Jupiter is millions of miles farther from the earth than Venus is. Just as we may learn from the brightness of the sun, which is not by any means a very big star, or from the brightness of the moon, which is really but a grain in the heavens compared with any star—so we may learn from the brightness of Venus that it is *nearness* which gives a thing value in our eyes; and that it is the business of our *minds'* eyes to find out which things are really the brightest and biggest, and which things are really the most important for the universe and in the universe—whether they be near to us or far from us.

THE STAR THAT CAN SOMETIMES BE SEEN IN DAYLIGHT

Leaving the sun and moon out of account, Venus is queen of the heavens as we see them—brighter not only than Jupiter, but also than the brightest of the stars.

When Venus is at its brightest, it can be seen by the naked eye in daylight, and that cannot be said either of Jupiter or of Sirius, which is the brightest of the stars as we see them. This intense brightness is entirely due, we know, to reflected sunlight, for the part of the planet on which at any time the sun's light does not fall is just as dark as we see in the case of the moon. The discovery of the *phases* of Venus, by which we mean the forms which she assumes at different times, was made by Galileo, as we read elsewhere.

We know scarcely anything about the surface of Venus, though we have evidence that the planet has an atmosphere. The mean distance of Venus from the sun is about 66,000,000 miles, and though its path must, of course, be a true ellipse, it is more nearly a circle than in the case of any of the other planets. The year of Venus is about 224 of our days. It is very likely that, as in the case of Mercury's movement

round the sun and the moon's movement round the earth, Venus spins on herself in the same time as she takes to go round the sun. Like Mercury, Venus has no moon, or satellite.

WHERE WE SHOULD MEET THE EARTH IF WE WERE TRAVELING FROM THE SUN

If we were traveling outwards from the sun, and studying the planets as we came to them, we should next meet a body very like Venus in some ways; indeed, hardly different from Venus in size. The mean distance of this body from the sun is rather less than 93,000,000 miles; its year is about 365¼ days, but its day, instead of being as long as its year—as we have seen in the case of the first two planets—is very much shorter, being just under twenty-four hours. This planet, unlike the two we have discussed, possesses one moon. What name the inhabitants of Mars apply to it—if there are any inhabitants of Mars—we do not know, but that group of its inhabitants who speak the language in which this book is written call it *the Earth.*

Traveling farther outwards, we come to the wonderful planet Mars. In the case of Mars, as in that of all the planets farther from the sun than the earth is, of course we do not see phases as we do in the case of the moon, Mercury, and Venus. But even the crescent of Venus is brighter than Mars, except, perhaps, at certain times, even though we always see the whole of the lighted half of Mars. The planet is reddish in color, thus suggesting blood, which suggests war, and this led to naming the planet after the god of war. Mars certainly gives out no light of its own, any more than Mercury, Venus, the earth, or the moon do. There must be something on its surface which gives the red tint to the sunlight which it reflects. It is probable that the planet is largely covered by great stretches of sand, which would explain its reddish color.

HOW MARS COMES AT TIMES VERY NEAR TO THE EARTH

Mars, of course, moves round the sun in an ellipse. This ellipse is very much farther from being a circle than in the case of the earth's orbit. Indeed, only Mercury has a more elliptical path than that of Mars. Kepler's great discovery of the movements of the planets and their laws largely depended upon watching the orbit of Mars, and it was Kepler's studies from which Newton, in his turn, discovered the law of gravitation.

Now, as the earth travels round the sun in what is very nearly a circle, while Mars travels in what we might call a rather oval path, outside the path of the earth, it follows that the distance between Mars and the earth varies a good deal. The year of Mars amounts to about 686 of our days, and so it is at regular intervals of years, as we call them, that Mars and the earth come nearest to each other. At the most favorable times Mars and the earth may be only 35,000,000 miles apart. If you draw a little picture for yourself, showing the sun, with the earth going round it, and Mars, farther away, also going round it, and if you remember that the earth is going round much more quickly than Mars, you will see that times must constantly return when the earth, rushing round, comes to lie just between the sun and Mars. When the sun, the earth, and Mars are in the same straight line, that is called the *opposition* of Mars—for, from the earth's point of view, the sun is on one side and Mars on the other, the two being opposed, or *opposite*, to each other.

THE GREAT QUESTION WHETHER THERE IS LIFE ON MARS

Of course, if Mars and the earth both moved in circles, the two planets would be equally near to each other at every opposition. But as the two paths are not of the same shape, that is not so. The two planets were very near each other at the opposition of 1892, and also in 1877, when the two moons of Mars were discovered.

The next favorable opposition was in the year 1909, when astronomers were expecting to learn, with their splendid new telescopes and instruments for studying light, much more about Mars than we have ever learnt before. The great question about Mars is whether it is inhabited by intelligent beings, and though I should like to spend a lot of time in discussing that question, I think it is better not to do so, just because we have learnt much more about the planet recently. One thing, however, we must learn, and that is the great fruit of knowledge gained from the two oppositions, which have added much to our knowledge though not so much as

we hoped. We have learnt, beyond all doubt, that there is water upon Mars, and we do not need to remind ourselves how important that is in its bearing on the question whether life of any kind can exist on the planet.

IS THE SURFACE OF MARS LIKE THE SURFACE OF THE EARTH WILL BE?

The average distance of Mars from the sun is 140,000,000 miles. The least and the greatest distances are 128,000,000 and 155,000,000 miles, a great difference, which shows us how far from circular the planet's path is—because, of course, if it went round the sun in a circle Mars would always be at the same distance from the sun. We have already seen the length of the year of Mars, which is 686 of our days. The diameter of the planet is about 4,200 miles. This is only little more than half the diameter of the earth.

The size of Mars largely explains, as in the case of the moon, the fact that the history of the planet has been a quicker one than that of the earth, and so we believe that the surface of Mars represents in many respects what the surface of the earth will be like in some distant age. The two things we specially note are, first, that the outside of the planet seems to have lost the greater part of its water; and, second, that the ages have worn its surface down to a great smoothness, just in the fashion which we seem to see going on in the case of the earth. If you ask why the moon has not been worn smooth in the same way, the answer is that the moon has no water or atmosphere to do the work. Mars has both.

HOW THE CAMERA IS DISCOVERING ANOTHER WORLD FOR US

Fortunately for us, Mars spins upon itself, not as Mercury and Venus do, nor as the moon does in relation to the earth, but at a rate quite different from its movement round the sun. This means, of course, that we are able to see all sides of Mars. It is, indeed, an amazing thing that we can see and study and map both Poles of Mars, though no human eye has ever seen some parts of the earth. The day of Mars is only about half an hour longer than the day of the earth; in other words, the planet spins completely round on its axis in rather more than twenty-four and a half hours.

The surface of Mars is largely covered with markings which look as if they had been made on purpose. For many years people said that these markings were only imagined, but they have now been photographed. Some people think that they are what they seem to be—canals made by intelligent beings and carrying water; but before we form an opinion on this we ought to wait for much more knowledge. Only please remember one thing. The digging of a canal on Mars would be very much easier work than digging a canal of the same size on the earth, because the planet's mass is so much less than that of the earth, and in consequence it would offer less resistance to lifting out the material when digging the canal. We must just remind ourselves that Mars has two moons, and that the inner one travels round Mars about three times a day. It is possible to say "three times a day," because the earth's day and the day of Mars are just about the same.

A WONDERFUL GROUP OF LITTLE WORLDS LIT UP BY THE SUN

If we travel outwards from Mars, we encounter a large number of small planets, usually called the minor—which means lesser—planets, that travel in a zone, or belt, between Mars and Jupiter. It was supposed that these had been formed by some large planet being shattered to bits, but we are as yet quite unable to explain the history of this wonderful group of hundreds of little planets. The first was discovered on the first evening of the nineteenth century, and was named Ceres.

We have long given up naming the minor planets, however, and most of them are now known simply by numbers and letters. They shine, so far as we know, entirely by reflected sunlight. It is probable that, as we travel outwards from them, the other bodies in the solar system shine not only by reflected sunlight, but also by some light of their own. From Jupiter outwards the planets contribute more and more of their own light to the light by which we see them; and it is especially interesting if we compare these four planets—Jupiter, Saturn, Uranus, Neptune—to find that, as we travel outwards from the sun, each of these planets contains more and more *hydrogen*, which glows and contributes

its own kind of light to the light by which we see them. It is interesting that there should be so much of the lightest of the elements in the outermost planets.

Far away beyond Mars and the minor planets, at an average distance of 483,000,000 miles from the sun, we find Jupiter, the largest of the planets. The year of Jupiter is more than 4,380 of our days, so that we may reckon, if we please, how many times the little earth goes round the sun while Jupiter completes one of his mighty years. This great planet has a diameter of about 87,000 miles; but though it is so large, its distance from the earth greatly interferes with our study of it. At the most favorable oppositions—or when it is most favorably *opposite* to us—Jupiter is about four times as far away from us as the sun is, and as his diameter is only one-tenth that of the sun, it is difficult to learn much about him.

When we come to study Jupiter, we find at once a very great difference indeed from any of the planets we have seen yet. This is not the mere question of size, but something much more interesting—the material of which the planet is made. Jupiter is not a solid, but partly a liquid and partly a gas.

JUPITER, A PLANET AS BIG AS 1,200 WORLDS LIKE OURS

This fact about Jupiter goes, of course, with what we have already learnt as to the planet giving out some light of its own, like the gaseous sun itself, though on a very much smaller scale. This huge mass of matter spins upon itself at an extraordinary speed.

The day of Jupiter is less than ten hours long, and as Jupiter is so much larger than the earth, we can reckon that anything on the equator of Jupiter must be spinning round 27 times as fast as anything on the equator of the earth. That is the reason why Jupiter bulges so much at the equator. We said that the diameter of the planet is 87,000 miles, but that is the diameter taken through the equator. The diameter from Pole to Pole is about 5,000 miles less. All this is due to the very rapid spinning of a body which is not made of rigid solids, but of liquid and gas.

If Jupiter is so differently made from the other planets we have studied, we shall expect that it is nothing like so dense, nothing like so heavy in proportion to its size, as the earth. Jupiter is about 1,200 times the size of the earth. But when we study the influence of the planet upon his own moons, or upon other planets, or upon comets, we find that his gravitation is just enough to mean that Jupiter is only about 300 times, instead of 1,200 times, as powerful as the earth. This means, of course, that the stuff of which Jupiter is made is, on the average, only about a fourth as heavy as the stuff of which the earth is made.

WHY IT SEEMS THAT JUPITER IS NOW LIKE THE EARTH USED TO BE

All this suggests to us strongly that, just as Mars and the moon represent stages in histories of worlds much later than the stage in which the earth is now, Jupiter represents a much earlier stage, such as the earth must have been in ages ago. Directly we ask why Jupiter should be so backward, as one might say, we see the answer at once. It must be because Jupiter is so big, and so loses his heat, and turns solid or freezes, as we might say, very slowly. If we compare the size and the present state of Jupiter, the earth, Mars, and the moon, we find the state of things just what we should expect. The smallest is the one that has, so to say, lived its life quickest, and the biggest is the one that is still young.

Jupiter has nine moons. It is possible that the outermost moon, and perhaps even more of them, may be really comets caught by the attraction of Jupiter, and compelled to travel round him. We can observe the influence of Jupiter's great size upon comets, and even upon the planets nearest him, and it is quite likely that Jupiter might catch a comet altogether. Such a comet would have no tail, and might appear like a moon to us.

The surface of Jupiter, like that of the sun, travels round at different rates in different parts. Maps of Jupiter differ from year to year. What the planet's future will be we can only guess.

SATURN, THE WORLD WHERE MEN WOULD BE OLD AT THREE YEARS OF AGE

Far out beyond Jupiter—indeed, almost twice as far as Jupiter from the sun—is the planet Saturn. Its average distance from the sun is about 870,000,000 miles. Its year is very nearly thirty of ours in length; it is not very much smaller than Jupiter, having a diameter

of over 70,000 miles. Like Jupiter, Saturn bulges much at its equator, and for the same reason. It is made of materials by no means rigid, and its day is only a little over ten hours, so that if there were men living on this planet, and they lived the same age as we do, they would be as old in three years as we are at ninety.

Like Jupiter, Saturn is very hot and light. We have probably never seen any more than the hot atmosphere of Saturn, just as we can see no farther than the hot atmosphere of the sun. Saturn is the least dense of all the planets—far less dense than the earth, or even than water. But it is so large that, though its density is so small, it yet weighs more than eighty times as much as the earth.

SATURN'S RINGS, UNLIKE ANYTHING ELSE WE KNOW IN THE SKY

Saturn has nine moons, and possibly more. The ninth has only lately been discovered, and moves in a very peculiar way. We must be careful not to take it for granted, as some people do, that the moons of all the planets were formed from these planets, as our moon was formed from the earth. It seems that this certainly cannot have been so in the case of the ninth satellite of Saturn.

But the great feature of Saturn is his rings, which are utterly unlike anything else we know in the sky. They were first seen by Galileo, but were not understood until after his time. The rings throw shadows on Saturn, showing that we see the planet mainly by reflected sunlight. We can prove that the rings cannot be solid, but must be made of separate parts. There seems to be no doubt that just now something is happening in Saturn's rings, and astronomers are closely watching the changes that are going on in them. Perhaps they may be broken up, and the stuff which makes them may be drawn into the planet, bringing the rings to an end.

URANUS, THE WORLD THAT LIES FAR BEYOND SATURN, AND HAS FOUR MOONS

Far out beyond Saturn, at an average distance of some 1,754 millions of miles from the sun, there travels another planet, known to mankind for less than a century and a half, which is called Uranus. This planet, like Jupiter and Saturn, is still far from having shrunk down into hardness. It is some 31,000 miles in diameter, and its year is about 83 of ours, so that it has only been about one and a half times round the sun since it was first seen by man. Uranus was discovered by a great German, called William Herschel, who made a living in England by music, but devoted to the study of the heavens every moment he could spare from earning his daily bread. We read his story on another page. Unable to afford a large telescope, this wonderful man made for himself what was then the largest telescope in the world, helped by his scarcely less wonderful sister, Caroline. He discovered Uranus in 1781.

The planet is too far away for us to know whether it spins on itself, and, if so, at what speed. It has four moons, also discovered by Herschel.

Though Uranus in the next sixty years after its discovery had not completed one revolution round the sun, astronomers found that its movements were not strictly in an ellipse.

Knowing the law of gravitation, astronomers were led to suppose that this irregularity in the movement of Uranus must be due to yet another planet, revolving round the sun at a still greater distance. In 1846 that planet was found.

HOW A MAN TURNED HIS TELESCOPE AND FOUND A WORLD NOT SEEN BEFORE

Calculations had been made, and astronomers were directed to look in a certain part of the heavens for the supposed planet that would account for the path of Uranus. They did so, *and found it.* Probably never in the history of knowledge has there been a more wonderful discovery. It stands to the immortal record of a Frenchman, Le Verrier, and an Englishman named Adams, who independently worked out where the unseen planet must be.

The name of Neptune was given to it, and we believe that it is the outermost member of the solar system. Its average distance from the sun is 2,750,000,000 miles—another 1,000 *million miles* beyond even Uranus; its year is about 165 of our years, so that it has not yet traveled half of one journey round the sun since its discovery about the middle of the nineteenth century. We know nothing of its spinning upon itself. It is slightly larger than Uranus, and it has one moon.

THE NEXT PART OE THIS IS ON PAGE 2541

THE PRINCE WHO WAS POOR

CONTINUED FROM 2319

THERE was once a poor Prince who had a kingdom. His kingdom was very small, but still quite large enough to marry upon; and he wished to marry.

It was certainly rather cool of him to ask the Emperor's daughter to marry him. But so he did; for his name was renowned far and wide.

It happened that where the Prince's father lay buried there grew a rose-tree—a most beautiful rose-tree, which blossomed only once in every five years, and even then bore only one flower, but that *was* a rose! It smelled so sweet that all cares and sorrows were forgotten by him who inhaled the fragrance.

The Prince also had a nightingale, which sang as though all the sweet melodies in the world had a dwelling in its little throat. These the Prince prized above all other possessions, and so he placed them in two silver caskets, and sent them to the Princess.

The Emperor had them brought into a large hall, where the Princess was playing with the ladies of the court; and when she saw the caskets she clapped her hands for joy.

"Ah, if there were but a little pussy-cat in one of the caskets!" she exclaimed; but just then the rose-tree, with its beautiful rose, came to view.

The young Princess touched it, and was almost ready to cry from disappointment.

"Oh, father!"

"Let us see what is in the other casket," proposed the Emperor. So the nightingale came forth, and sang so delightfully that at first no one could say anything ill-humored of it. Everyone but the Princess was charmed.

"I hope that it is not a real bird," said the Princess.

"Yes, it is a real bird," said those who had brought it. "Well, then, let the bird fly," returned the Princess; and she positively refused to see the Prince.

However, he was not easily discouraged. He was determined to see her, so he daubed his face with brown and black, pulled his cap over his ears, and knocked at the door.

"Good-day to my lord the Emperor," he said. "Can I have employment at the palace?"

"Why, yes," said the Emperor; "I want someone to take care of the pigs, of which we have a great many."

So the Prince was appointed "Imperial Swineherd." He had a dirty little room close by the pigsty, and there he sat the whole day and worked. By the evening he had made a pretty little saucepan. Little bells were hung all round it; and while the pot was boiling these bells tinkled merrily, and played an old melody.

But, what was still more curious,

whoever held his finger in the steam from this saucepan smelled the dishes that were cooking on every hearth in the city.

Now, the Princess happened to walk that way, and when she heard the tune she stood quite still, and seemed pleased, for she could play this old tune—it was the only piece she knew.

"Why, there is my piece," said the Princess; "that swineherd must certainly have been well educated. Ask him the price of the instrument."

So one of the court ladies ran in.

"What will you take for the saucepan?" inquired the lady.

"I will have ten kisses from the Princess," said the swineherd.

"Indeed!" said the lady.

"Well, what does he say?" asked the Princess.

"I cannot tell you," replied the lady; "it is too bad!"

"Then you can whisper it!" So the lady whispered it.

"He is an impudent fellow!" said the Princess, and she walked on. But when she had gone a little way the bells tinkled so prettily that she stopped.

"Ask him if he will have ten kisses from my companions," said she.

"No, thank you!" answered the swineherd; "ten kisses from the Princess, or I keep the saucepan myself."

"That must not be, either," said the Princess; "but do you all stand before me, that no one may see us."

The court ladies placed themselves in front of her, and spread out their dresses, and the swineherd got ten kisses, and the Princess the saucepan.

That was delightful. The saucepan was kept boiling all the evening, and the whole of the following day. They knew perfectly well what was cooking at every fire in the city, from the chamberlain's to the cobbler's. The court ladies danced and clapped their hands.

"We know who has soup and who has pancakes for dinner to-day, who has cutlets and who has eggs. How interesting!" said the court ladies.

The swineherd—that is to say, the Prince, although no one knew that he was other than an ill-favored swineherd—let not a day pass without working at something. At last he constructed a rattle which, when it was swung, played all the waltzes and jig-tunes which had ever been heard.

"Ah, that is wonderful!" said the Princess, when she passed by. "Ask him the price of the instrument."

"A hundred kisses from the Princess," said the young lady who had asked.

"I think he is not in his right senses," replied the Princess, and walked on; but when she had gone a little way she stopped. "We must encourage art," she said. "Tell him he shall have ten kisses from me, and the rest from you."

"Oh, but we should not like that at all!" they said.

"What are you muttering?" asked the Princess. "If I can kiss him, surely you can!"

So the young ladies were obliged to go to him again.

"A hundred kisses from the Princess!" he said.

"Stand around!" said the Princess; and all the ladies stood around while the swineherd kissed the Princess.

"What can be the reason for such a crowd close by the pigsty?" said the Emperor, who happened just then to step out on the balcony. "I must go down to see what they are about!"

When he reached the courtyard he moved very softly, and the ladies were so much engrossed with counting the kisses that they did not see the Emperor.

"What is all this?" he said, when he saw what was going on; and he boxed the Princess's ears, just as the swineherd was taking the eighty-sixth kiss.

"March out!" cried the Emperor, for he was very angry; and both Princess and swineherd were thrust outside the city.

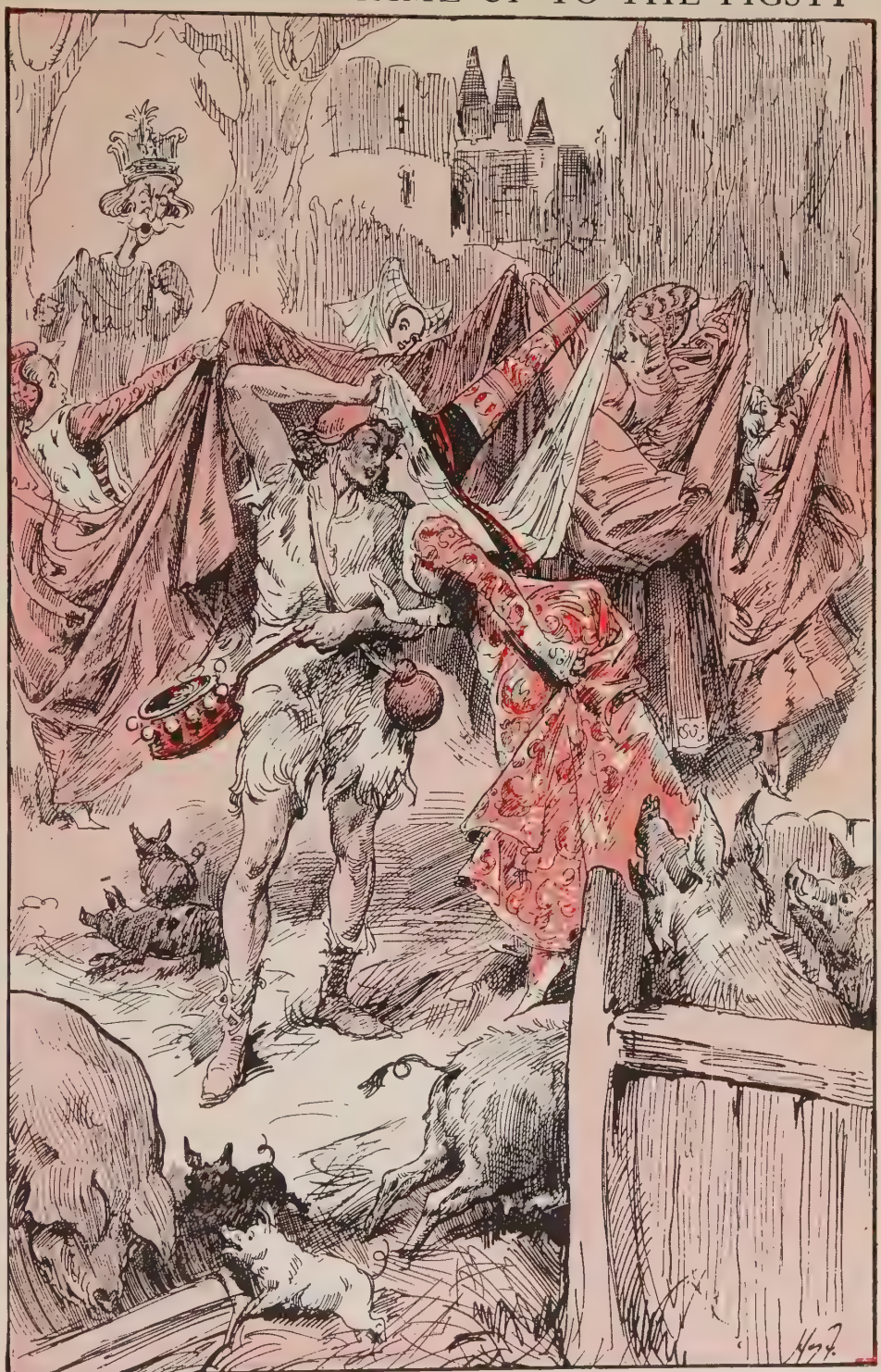
"Alas!" cried the Princess. "If I had but married the handsome young Prince! Ah, how unfortunate I am!"

Then the swineherd went behind a tree on the river bank, where he had hidden his own garments. There he washed the color from his face, threw off his dirty clothes, and when he stepped forth in his princely robes he looked so noble that the Princess could not help but bow before him.

"You are rightly served!" he said. "You would not marry an honorable Prince; you could not prize the rose and the nightingale; but you were ready to kiss the swineherd for the sake of a trumpery plaything!"

And the poor Prince, turning away, went back to his kingdom alone.

THE EMPEROR CAME UP TO THE PIGSTY



As soon as the Emperor reached the courtyard he moved very softly, and the ladies were so engrossed with counting the kisses that they did not see him. "What is all this?" he said, when he saw what was going on.

THE MERRY COBBLER AND HIS COAT

A TALE FROM GRANNY'S WONDERFUL CHAIR

SPARE, the merry cobbler, of whom we read on page 2311, where this tale begins, was treated like a prince at the King's court; and the news of his good fortune reached his brother Scrub in the moorland cottage one first of April, when the cuckoo came again with two golden leaves.

"Think of that!" said Fairfeather. "Here we are spending our lives in this humdrum place, and Spare making his fortune at court with two or three paltry green leaves! What would they say to our golden ones? Let us make our way to the King's palace."

Scrub thought this excellent reasoning. So, putting on their holiday clothes, Fairfeather took her looking-glass and Scrub his drinking-horn, which happened to have a very thin rim of silver, and, each carrying a golden leaf carefully wrapped up that none might see it till they reached the palace, the pair set out in great expectation.

How far Scrub and Fairfeather journeyed I cannot say, but when the sun was high and warm at noon they came into a wood feeling both tired and hungry.

"Let us rest ourselves under this tree," said Fairfeather, "and look at our golden leaves to see if they are quite safe."

In looking at the leaves, and talking of their fine prospects, Scrub and Fairfeather did not perceive that a very thin old woman had slipped from behind the tree, with a long staff in her hand and a great wallet by her side.

"Noble lord and lady," she said, "will ye condescend to tell me where I may find some water to mix a bottle of mead which I carry in my wallet, because it is too strong for me?"

As the old woman spoke, she pulled out a large wooden bottle such as shepherds used in the ancient times, corked with leaves rolled together, and having a small wooden cup hanging from its handle.

"Perhaps ye will do me the favor to taste," she said. "It is only made of the best honey. I have also cream cheese and a wheaten loaf here, if such honorable persons as you would not think it beneath you to eat the like."

Scrub and Fairfeather became very condescending after this speech. They were now sure that there must be some appearance of nobility about them; besides, they were very hungry, and, having hastily wrapped up the golden leaves, they assured the old woman they were not at all proud, notwithstanding the lands and castles they had left behind them in the North Country, and would willingly help to lighten the wallet.

The old woman was a wood-witch; her name was Buttertongue; and all her time was spent in making mead, which, being boiled with curious herbs and spells, had the power of making all who drank it fall asleep and dream with their eyes open. She had two dwarfs of sons; one was named Spy, and the other Pounce. Wherever their mother went, they were not far behind; and whoever tasted her mead was sure to be robbed by the dwarfs.

Scrub and Fairfeather sat leaning against the old tree. The cobbler had a lump of cheese in his hand; his wife held fast a hunch of bread. Their eyes and mouths were both open, but they were dreaming of great grandeur at court, when the old woman raised her shrill voice:

"What ho, my sons! Come here, and carry home the harvest!"

No sooner had she spoken than the two little dwarfs darted out of the neighbouring thicket.

"Idle boys!" cried the mother. "What have you done to-day to help our living?"

"I have been to the city," said Spy, "and could see nothing. These are hard times for us — everybody minds his business so contentedly since that cobbler came. But here is a leathern doublet which his page threw out of the window; it's of no use, but I brought it to let you see I was not idle." And he tossed down Spare's doublet with the merry leaves in it, which he had been carrying like a bundle on his little back.

To explain how Spy came by it, it must be said that the forest was not far from the great city where Spare lived in such high esteem. All things

TWO DWARFS RAN UP TO THE OLD WITCH

Scrub and Fairfeather sat leaning against the old tree. The cobbler had a lump of cheese in his hand; his wife held fast a hunch of bread. Their eyes and mouth were both open, but they were dreaming of grandeur at court, when the old woman raised her shrill voice, and two little dwarfs darted out of the thicket.

had gone well with the cobbler till the King thought that it was quite unbecoming to see such a worthy man without a servant. His Majesty therefore appointed one of his own pages to wait upon him. The name of this youth was Tinseltoes, and nobody in all the court had grander notions. Nothing could please him that had not gold or silver about it, and his grandmother feared he would hang himself for being appointed page to a cobbler. As for Spare, the honest man had been so used to serve himself that the page was always in the way, but his merry leaves came to his assistance.

Tinseltoes took wonderfully to the new service. Some said it was because Spare gave him nothing to do but play at bowls all day on the palace green. Yet one thing grieved the heart of Tinseltoes, and that was his master's leathern doublet, and at last, finding nothing better would do, the page got up one fine morning earlier than his master, and tossed the leathern doublet out of the window into a lane, where Spy found it.

"That nasty thing!" said the old woman. "Where is the good in it?"

By this time Pounce had taken everything of value from Scrub and Fairfeather —the looking-glass, the silver-rimmed horn, the husband's scarlet coat, the wife's gay mantle, and, above all, the golden leaves, which so rejoiced old Buttertongue and her sons that they threw the leathern doublet over the sleeping cobbler for a jest, and went off to their hut in the heart of the forest.

The sun was going down when Scrub and Fairfeather awoke from dreaming that they had been made a lord and a lady, and sat clothed in silk and velvet, feasting with the King in his palace hall. It was a great disappointment to find their golden leaves and all their best things gone. Scrub tore his hair, and vowed to take the old woman's life; while Fairfeather lamented sore. But Scrub, feeling cold for want of his coat, put on the leathern doublet without asking whence it came.

Scarcely was it buttoned on when a change came over him. He addressed such merry discourse to Fairfeather that, instead of lamentations, she made the wood ring with laughter. Both busied themselves in setting up a hut of boughs, in which Scrub kindled a fire with a flint of steel, which, together with his pipe, he had brought unknown to Fairfeather, who had told him the like was never heard of at court. Then they found a pheasant's nest at the root of an old oak, made a meal of roasted eggs, and went to sleep on a heap of long green grass which they had gathered, with nightingales singing all night long in the old trees about them.

In the meantime Spare had got up and missed his doublet. Tinseltoes, of course, said he knew nothing about it. The whole palace was searched, and every servant questioned, till all the court wondered why such a fuss was made about an old leathern doublet. That very day things came back to their old fashion. Quarrels began among the lords, and jealousies among the ladies. The King said his subjects did not pay him half enough taxes, the Queen wanted more jewels, the servants took to their old bickerings and got up some new ones. Spare found himself getting wonderfully dull, and very much out of place, and nobles began to ask what business a cobbler had at the King's table; till at last his Majesty issued a decree banishing the cobbler for ever from court, and confiscating all his goods in favor of Tinseltoes.

That royal edict was scarcely published before the page was in full possession of his rich chamber, his costly garments, and all the presents the courtiers had given him; while Spare was glad to make his escape out of the back window, for fear of the angry people.

The window from which Spare let himself down with a strong rope was that from which Tinseltoes had tossed the doublet, and as the cobbler came down late in the twilight, a poor woodman, with a heavy load of faggots, stopped and stared in astonishment.

"What's the matter, friend?" said Spare. "Did you never see a man coming down from a back window before?"

"Why," said the woodman, "the last morning I passed here a leathern doublet came out of that window, and I'll be bound you are the owner of it."

"That I am, friend," said the cobbler with great eagerness. "Can you tell me which way that doublet went?"

"As I walked on," the woodman

said, "a dwarf, called Spy, bundled it up and ran off into the forest."

Determined to find his doublet, Spare went on his way, and was soon among the tall trees; but neither hut nor dwarf could he see. At last the red light of a fire, gleaming through a thicket, led him to the door of a low hut. It stood half open, as if there was nothing to fear, and within he saw his brother Scrub snoring loudly on a bed of grass, at the foot of which lay his own leathern doublet; while Fairfeather, in a scarlet kirtle, sat roasting pheasants' eggs by the fire.

"Good - evening, mistress!" said Spare.

The blaze shone on him, but so changed was her brother-in-law with his court life that Fairfeather did not know him, and she answered far more courteously than was her wont.

"Good - evening, master! Whence come ye so late? But speak low, for my good man has sorely tired himself cleaving wood, and is taking a sleep, as you see, before supper."

"A good rest to him," said Spare, perceiving he was not known. "I come from the court for a day's hunting, and have lost my way in the forest."

THE ASTONISHED WOODMAN STARED AT SPARE

"Sit down and have a share of our supper," said Fairfeather; "I will put some more eggs in the ashes; and tell me the news of court."

"Did you never go there?" said the cobbler. "So fair a dame as you would make the ladies marvel."

"You are pleased to flatter," said Fairfeather; "but my husband has a brother there, and we left our moorland village to try our fortune also. An old woman enticed us with fair words and strong drink at the entrance of this forest, where we fell asleep and dreamt of great things; but when we woke everything had been robbed from us, and, in place of all, the robbers left him that old leathern doublet, which he has worn ever since, and never was so merry in all his life, though we live in this poor hut."

"It is a shabby doublet, that," said Spare, taking up the garment, and seeing that it was his own, for the merry leaves were still sewed in its lining. "It would be good for hunting in, however. Your husband would be glad to part with it, I dare say, in

exchange for this handsome cloak." And he pulled off the green mantle and buttoned on the doublet, much to Fairfeather's delight, for she shook Scrub, crying:

"Husband, husband, rise and see what a good bargain I have made!"

Scrub rubbed his eyes, gazed up at his brother, and said:

"Spare, is that really you? How did you like the court, and have you made your fortune?"

"That I have, brother," said Spare, "in getting back my own good leathern doublet. Come, let us eat eggs, and rest ourselves here this night. In the morning we will return to our own old hut, at the end of the moorland village, where the Christmas cuckoo will come and bring us leaves."

Scrub and Fairfeather agreed. So in the morning they all returned, and found the old hut little the worse for wear and weather. The neighbors came about them to ask the news of court, and see if they had made their fortune. Everybody was astonished to find the three poorer than ever, but somehow they liked to be back in the hut. Spare brought out the lasts and awls he had hidden in a corner; Scrub and he began their old trade, and the whole North Country found out that there never were such cobblers. Everybody wondered why the brothers had not been more appreciated before they went away to the court of the King, but, from the highest to the lowest, all were glad to have Spare and Scrub back again.

They mended the shoes of lords and ladies as well as the common people; everybody was satisfied. Their custom increased from day to day, and all that were disappointed, discontented, or unlucky, came to the hut as in old times, before Spare went to court.

The hut itself changed, no one knew how. Flowering honeysuckle grew over its roof; red and white roses grew thick about its door. Moreover, the Christmas cuckoo always came on the first of April, bringing three leaves of the merry tree—for Scrub and Fairfeather would have no more golden ones. So it was with them when I last heard the news of the North Country.

SPARE PULLED OFF THE GREEN MANTLE AND BUTTONED ON THE OLD LEATHERN DOUBLET

LEGENDS OF PLACES AND THINGS

KING WREN

WHEN all the birds came together to choose their king, there was much dispute as to the manner of choosing.

"Beauty is what we want in a king," said the peacock. "Let us show off our feathers."

"No, we need dignity," said the owl. "Let us see who is the wisest looking."

"Or who can talk the best," said the parrot.

But the eagle exclaimed:

"What raises us above all other creatures? The power of flying. We must choose as a king the bird that flies the highest."

And as the eagle was strong and fierce, he compelled the assembly to agree to this test. As a signal, the birds rose up, and tried to outfly each other, but the eagle soon soared above them all, and went up to an amazing height until his strength was exhausted. Then a wren, who had been perching on his back, flew a little higher than the eagle had gone. So, to the great disgust of the eagle, the little wren became king.

THE POET, THE GOBLIN, AND THE DONKEY

FAIRIES have more powers of magic than witches, and great poets have more powers of magic than fairies. Great poets can raise up mighty nations with their enchantments, and people the waste places with shining spirits.

Thomas the Rhymer was one of the last of these great poets. He could sing a man's soul out of a man's body, and send it whither he willed. One day the youngest daughter of the Queen of Scotland fell ill of the disease which no leech can cure, and the Queen sent Thomas the Rhymer to get some magic ointment from the goblin hiding in the heart of Ailsa Craig. Thomas the Rhymer came to Ailsa Craig and began to chant strange chants there. He chanted the head of the goblin out of the great rock; he chanted its shoulders out. But just as he was chanting out its hand holding the magic ointment, a donkey brayed and spoiled his chant, and frightened the goblin clean out of the rock, and the goblin escaped with the magic ointment. So it has happened ever since. Some donkey always begins to bray when a great poet begins to sing. That is why no great poet nowadays can work such marvelous enchantments as Thomas the Rhymer worked before he went to Ailsa Craig.

THE GIANT OF THE PEAK

KITTY GREEN was a little girl who lived in the Peak district, and one Sunday, instead of going to church, she went for a walk. And she walked until she came to an enchanted mountain, which made everybody who trod on it fall asleep. So Kitty fell asleep, and the giant of the Peak found her and carried her to his castle, and made her his servant. After Kitty had cleaned his enormous boots, he said:

"Come and hold my golden ring and ball while I bathe, and mind you don't let the ball fall into the ring."

Kitty took them, but just as she was wishing she was back at home she let the ball slip into the ring, and she at once found herself at home with her father and mother. Then, every time that she wished for anything she only had to put the ball in the ring and her wish was at once granted. So she became very rich and happy.

THE BROWNIE OF SNAEFELL

BROWNIES are different from fairies. They are little clumsy goblins with hairy legs, and they are good-natured, but rather stupid. A farmer in the Isle of Man befriended a brownie, and the brownie offered to bring down the farmer's sheep from Snaefell mountain.

"Whoo!" he said, when he returned late at night. "That little ram of yours was a trouble. I had to chase him three times round Snaefell before he would come with the other sheep."

"My little ram?" said the farmer. "I haven't one."

He looked at the sheep, and among them he saw a poor, tired hare! Now, could you fancy a fairy mistaking a hare for a sheep? But brownies are like that—good-natured, but rather stupid.

THE FABLES OF ÆSOP THE SLAVE

THE LARK AND HER YOUNG ONES

A LARK once had a nest of young birds in a cornfield, and one morning as she went out to seek food for them she told the little larks to listen very carefully to anything they might hear the farmer say, and to tell her when she came back.

On her return they said that the farmer had been there with his son, and had arranged to ask his neighbors to come upon the next day and help him to reap the corn.

"Then," said the old bird, "there is no danger yet."

Next day the young larks told their mother that the farmer had been there again, and had told his son to ask his cousins to come and help to reap the corn. The old lark still said that there was no danger yet.

On the third day the young birds told their mother how the farmer had said

that next morning he would reap the corn himself.

"Then," answered the mother lark, "it is time that we went somewhere else. The farmer's neighbors and friends were not very likely to come and help him; but if he is going to reap the corn himself we must move our home to another field."

If you want a thing done, do it yourself.

THE FOX AND THE WOLF

A FOX had the misfortune to fall into a well, where he was in danger of drowning. He cried out for help, and a wolf happened to hear him, and came running up to see what was the matter.

"Oh, Mr. Wolf," cried the fox, "pray lend me a hand and help me out, or I shall be drowned!"

"Poor creature!" cried the wolf. "How sorry I am to see you in such a fix! How long have you been here? However did it happen? The water must feel very cold. Is it very deep?"

"Come, come!! This is no time for talking," said the fox. "Help me out

of the water first, and then I will tell you all about it."

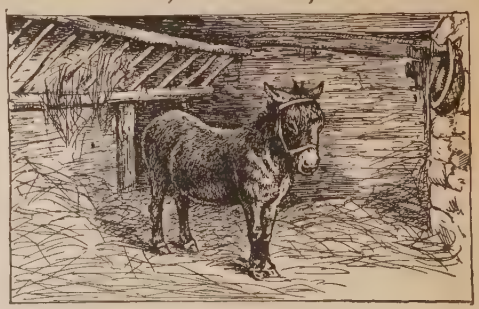
Don't stand talking when there is work to be done.

THE DONKEY'S WISH

ONE cold winter's day a discontented donkey was wishing for a little warm weather and some fresh grass, instead of the cold shed in which he stood and the dry straw that he had to eat.

By and by the warm spring weather came and the fresh grass with it; but the donkey had now so much work to do that he soon grew tired of the spring and longed for the summer. When summer came he found himself still worse off, for he had to carry hay and vegetables through the long, hot days.

So he wished for the autumn to come; but when it arrived he had to work hard and carry grain, apples, fuel, provisions for the winter, and so on; until at last



he began to long for winter, when, at any rate, he would be able to rest, even if he did not have much to eat.

Try to be contented with what you have. Remember that you might be much worse off than you are.

THE NEXT STORIES BEGIN ON PAGE 2629.

THE LIVING FLOWERS OF THE SEA

These creatures are the simplest forms of animal life now existing, and in many ways resemble the lower forms of vegetable life.

A. Trumpet anemone
A1. Purple-tipped sea-urchin
B. Snake-locked anemone
B1. Gold-spangled anemone
C. Brittle starfish
D. Plumose anemone
E. Scarlet-fringed anemone
F. Diadem pimplet anemone
G. Beadlet anemones
H. The opelet anemone
J. Pink-feather-star
K. Sea-cucumber
L. Globehorn anemone
M. Glaucous pimplet anemone
N. Dahlia wartlet anemone
O. Tuft coral
P. Anemone on whelk-shell
Q. Venus's flower-basket
R. Capelet anemone
S. Tube-forming annelids
T. Arrow nuzzlet in sand: T and T1, exposed
U. Sea-cucumber
V. Five-finger starfish
W. Deep-sea cup coral
W1. Deep-sea cup coral open; and W1 & W2 closed
X. Scarlet star-coral
Y. Siphon-worm in shell
Z. Siphon-worm

Most of these have feelers, and depend chiefly on the sense of touch for food. The feelers seize the food and draw it into the stomach.

THE FISHES OF THE SEA

WE know that all life began in the sea, and we have read on page 52 how life came out of the sea to cover the land. But life did not leave the sea for ever. There is still more life in the depths of the ocean than on the land. The sea teems with unnumbered forms of life—life as simple as that which first swam in the waters, and life as wonderful as that of the whales and dolphins and seals. There are fishes that sail through the air so high above the water that we call them flying fishes. There are fishes that can crawl out of the water and walk overland. There are fishes that build nests at the bottom of the sea, creatures that build islands and sea-walls; and in cliffs and mountains we find myriads of skeletons of tiny creatures that once lived and breathed on the ocean-bed. In these pages we read of the many wondrous forms of life in the seas to-day.

THE WORLD IN THE WATERS

CONTINUED FROM 2346

NOT the wisest men on earth know the full story of the sea and its wonders. How can they? They have to seek knowledge from the things that their dredges bring up. That is as if we set to work to examine some great, deep lake by bringing up things from its depths in a teaspoon. However, patient work is constantly bringing new learning to us. We know that there is no place in the ocean where life is not possible. The waters of the equatorial regions and the seas of the temperate zone abound with life, but so also do the silent waters of the frozen Arctic Circle.

Nature will have no blank spaces. There is a place for everything, and we find everything in its place. We find, swimming upon the surface, creatures which cannot descend. In the middle depths we find fish which cannot come to the surface lest, without the proper pressure of water upon their bodies, they should burst. Those same creatures cannot descend beyond a certain level; and below these there are creatures which never see the light, fulfilling in the unlit depths of ocean the purpose for which they were created.

For the present it will be interesting for us to glance at some of the lowest forms of life in the sea. We shall find it as wonderful as anything in the whole of Nature's fascinating story. Let us consider the marvels of that class of tiny organisms called *infusoria*. They exist in fresh water and in the water of the sea. In a single cupful of pond-water, such as certain infusorians love, there may be more of them than there are people in the whole world. The rate at which they grow is astounding. One infusorian breaks up into two; two become four; four become eight; eight become sixteen, and so on, almost as we watch.

Given the proper temperature and nourishment, a single infusorian may become in four days the ancestor of a million like itself, in six days of a billion, in seven and a half days of a hundred billions. From that tiny speck we have in seven and a half days this countless host, weighing over 200 lbs. Of course, the numbers do not work out like this, for there are merciful checks, or the whole earth and its seas would not hold the creatures that are born.

Floating upon the surface of the sea, and stacked high over its bed, are countless billions of these and similar tiny creatures, dead and living. Of what are the glorious white walls of England, the beautiful chalk cliffs one sees there, composed? Of nothing but the shells of the tiniest little creatures, which

we call *foraminifera*. They were all living creatures millions of years ago. They were born and had their day, and they died, piles upon piles of them, and their shells turned to chalk. And other white cliffs, which may some day rise above the waters, are still being built up beneath the sea to-day. The tiny specks of life in their little shells are still being born, and are still dying down in the sea, and they are forming ooze which will some day be solid chalk. It would take about ten millions of them to make a pound of chalk, but there have been enough to make millions of tons of chalk.

THE LITTLE INSECTS THAT BUILT UP THE STONES OF PARIS AND BERLIN

Some of the greatest mountain ranges, the Alps and the Balkans, consist largely of the shells of little creatures like these, called nummulites. Among the greatest wonders in the world are the Sphinx and the Pyramids in Egypt, built of dead nummulites. They grew in seas which ran where dry land now is. They formed the Arabian chain of mountains; from these mountains men cut the great blocks of which the Sphinx and Pyramids are composed. Paris is built of stone from a similar source, and Berlin stands upon foundations made up entirely of the skeletons of tiny animals.

In view of all this, we shall not be surprized to learn of the wonders of the coral builders. These are very tiny sea animals, which appear in their glory only in the warm waters of sunny seas. We all know what coral is, the beautiful pink polished substance of which necklaces, bracelets, and scores of pretty ornaments are made. We know what coral is, but the way in which it is made was for two thousand years a mystery.

THE LITTLE CORAL BUILDERS THAT WORK DOWN IN THE SEA

Long, long ago, men had been in the habit of bringing it up from the sea in nets and by other means. The common fishermen could not be expected to know a great deal about its composition, but the wise men thought they knew more, and they all agreed that coral was simply a sort of rocky flower grown in the sea. But how could a flower be hard? That was quite simple, they said. The fishermen told them that coral, when in the sea, was quite soft like any other flower, but that as soon as it reached the air it became as hard as rock. And for ages that was believed. But a man who wished to know more sent down a diver, who found, of course, that coral beneath the waves is as hard as coral above the waves. The good man could not believe the word of his diver, but went down in the water to see for himself.

We know now that the coral builder is one of the tiny, tireless workers of the sea. The coral animals are as numerous as the stars of heaven. When born, they are quite soft, jelly-like little things. But they have the power to extract calcium carbonate from the sea-water, and to build with it the most wonderful structures to live in. As a bee makes honey, so the coral animals make a shell from their own food. They build homes of coral for themselves. A number of them work together, and they make their houses join by neat canals or passages. But there are many forms which the buildings take.

THE WONDERFUL ANIMAL WALL THAT RISES FROM THE BOTTOM OF THE OCEAN

Some form the loveliest structures, looking like flowers. The colors are not always the same. There are browns and blues and greens, as well as the more common pink. This coral home is not made as a bird makes its nest, not as the mud plaster in which the rhinoceros loves to bury himself in a swamp; the coral is part of the coral animal itself. It isssues from the soft interior of the little animal's body, and is its stony skeleton.

Countless hosts of coral insects working together join their skeletons or coverings to each other. They build up from the shallow water, growing best where the waves may dash upon them. They make great reefs or barriers in the sea where, before, the waves flowed unchecked. The coral insects build islands. They put a great ring of coral round a tract of water, and make a lake within the boundaries of their work, as we see in the picture on page 921. In places where they are most numerous they quite change the character of the sea. The buildings are the actual coverings of the coral insects' bodies. They become solid rock, forming dry land for thousands of miles in the sea. It is the most wonderful work that these little animals do by their own efforts.

STARFISH & ANIMAL-FLOWERS OF THE SEA

The brittle starfish.

A big sea-slug.

The delicate feather starfish.

A "man-of-war."

Anemones, animals which resemble flowers, but hunt and kill.

Colony of polyps.

These are two remarkable pictures of sea-anemones, both shown with their mouths wide open and their tentacles spread out ready to grasp the little sea-animals upon which they feed. These sea-anemones look like flowers of the fairest shape and hue, yet they are animals. They hunger, and hunt and kill living prey to satisfy their hunger. They take into partnership other animals, like the hermit crab, that can help them to get food. Riding on the crab's back, they help him to kill his victims, and then share the meal with him. The Portuguese man-of-war is a beautiful thing, but it stings painfully.

The photographs on pages 2413 and 2407 are by Mr. Arthur Ullyett, and the lower picture on page 2410 is from a photograph in Dr. Carpenter's book, "The Microscope," by permission of Messrs. J. & A. Churchill.

We have read in the story of the lighthouse, on page 749, how very difficult men, with all their skill and all their fine tools, find it to build a lighthouse in the sea, but here these tiny animals, working in the depths of the furiously tossing waves, build structures which have no likeness in the world. One of their works consists of a barrier reef along the shores of New Caledonia, 400 miles long, and another, along the north-east coast of Australia, 1,000 miles in extent. As a great man points out, this means a work by these tiny things beside which the wall of China and the Pyramids of Egypt are like children's toys. The work has been going on for many ages, it is going on to-day. Of course, the result is often very serious to ships, which run on to the coral reefs and are wrecked. But that should not happen, for we have charts of the seas to guard our sailors against wreck in such ways.

LIVING AND BUILDING AND DYING IN THE BLUE SEA

If they do damage in this manner, the coral builders are friends to mankind in another way—they provide homes for men where only the angry sea once appeared. Sea-worms of various sorts bore into the coral and loosen it, so that the waves break it up. The great waves pick up huge blocks of the loosened coral, and throw them high up on the reefs, grinding much of them to powder. Shells and sand collect and are ground up together by the action of the waves. The powdered mass collects in the crevices of the reef, and presently seeds blown from afar, or carried by the sea, or brought by birds, take root in the soil that has been slowly forming. Entire trunks of trees, that have been torn up and carried down the rivers and out to sea, find a lodging here. With these trees come small animals, like lizards and insects. Trees grow, sea-birds settle; tired land-birds, blown out to sea, take rest; and at last man comes, to find trees and fruit and birds and other forms of life. Here is a home ready made for him. He cuts down the trees and builds himself a house, and there we have a new part of the world prepared for human habitation. But the creators of it were the myriads of coral animals, living and building and dying in the blue sea.

Growing on the coral reefs and adding to their beauty, we find a great many sea-anemones. At first sight we should say that these are vegetable growths. Their very name suggests it.

THE LIVING FLOWERS THAT GROW ON THE LIVING WALLS OF THE SEA

The wood-anemone we all know, the pretty flower of our American woodlands. Surely, then, the sea-anemone must be our wood-anemone's cousin, growing in the sea? But the anemone of the sea is an animal, which can kill and eat other forms of animal life, and, by some process of instinct too mysterious for us to understand, can enter into partnership with other animals, just as birds enter into partnership with crocodiles, buffaloes, and rhinoceroses. This animal-plant or plant-animal, as we think it, grows in the most elaborate and gorgeous forms. A fairy wand could not create more charming pictures than the anemones present. Some of them appear to have a sense of sight, for what look like eyes appear. They depend, however, chiefly on touch for their food. They have long, sensitive feelers, which look like petals or fringe. These, when anything fit for anemone to eat touches them, close like a flash upon it, and draw it down the tube leading to the anemone's stomach.

Let us watch them in a sea aquarium. The anemone, glistening and gay, grows at the bottom of the water, or on the side of the glass, like some extraordinary fringed mushroom with its head the wrong way up. There is nothing to suggest that this is a hungry little animal. But wait.

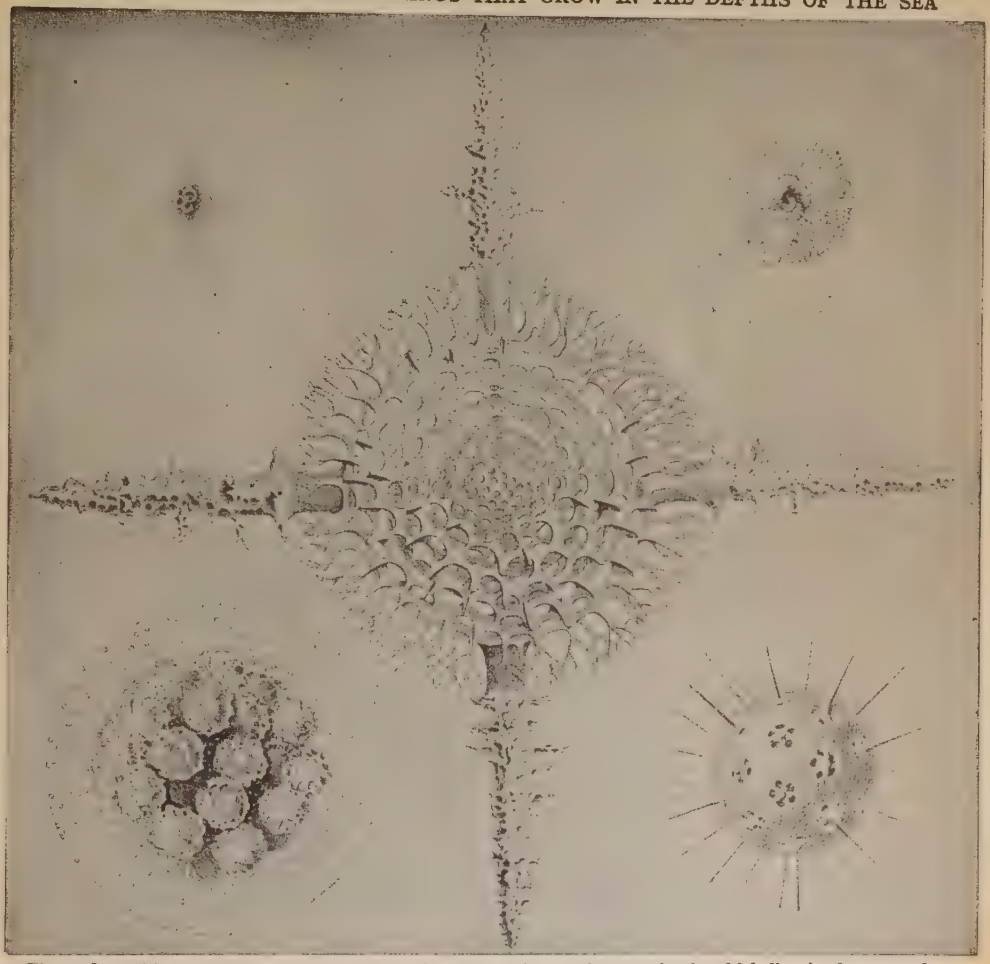
HOW THE ANEMONE LIVES WITH THE CRAB, & THE CRAB WITH THE SPONGES

A lively shrimp darts through the water. The tentacles of the anemone are instantly all in a quiver, ready to catch the little shrimp. The shrimp's instinct or experience tells him what that means, and he darts away if he can. But he cannot always do so. The anemone must live and have his shrimps, or other form of food, and the tentacles close rapidly in, causing the anemone to shut up like a flower which is going to sleep for the night. And if the effort made is quick enough, the poor shrimp is encircled by those terrible tentacles, and drawn in to make a good meal for the deceitful anemone.

There are countless anemones growing upon our seashores. Some look like rosettes, others like bobbins with a frayed, fringed top. The fringe of tentacles lies widely expanded, and we should never dream how quickly they can move. Let us touch the top of the anemone with a finger. It closes at once upon our finger, and we feel that each little spike of the fringe is roughened at the end, and gives a distinct pull at our finger, like the rasped claw of some insect. They are not strong enough to take in our finger, but they have received the necessary impulse which sets them at work. The anemone shuts up, believing—if we may use that word—that it has caught a meal, and for some minutes you will find that it will not attempt to reopen.

It is a humble, lowly form of life, yet there seems so much purpose and set plan about the way of the anemone that we are bound to confess that we are amazed and bewildered at such apparent method and skill. But the wonder only begins here. The partnerships of the anemone are the most wonderful feature of its life. Let us consider for a moment Messrs. Crab, Anemone, and Co. We all know about the hermit crab, for we have seen its portrait and read of its doings on page 1426. Now, as we saw there, the hermit crab, while a vicious, quarrelsome little rascal, has no shell to cover his tail. That

SOME OF THE WONDERFUL THINGS THAT GROW IN THE DEPTHS OF THE SEA

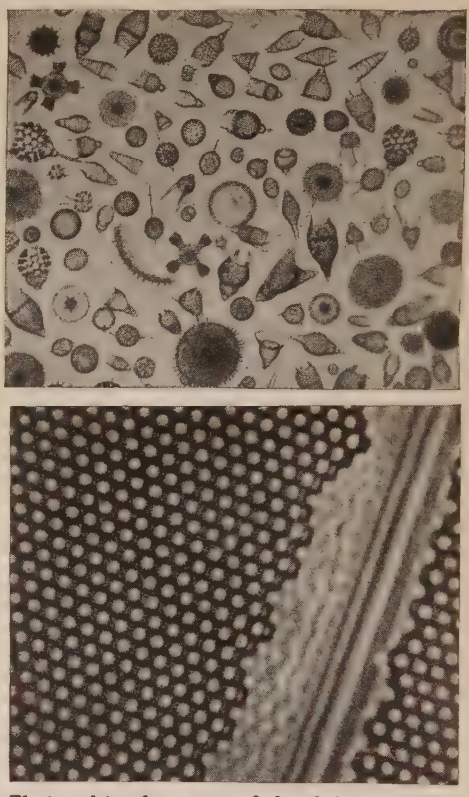


These five objects are the greatly magnified pictures of the minute animals which live in the sea, whose skeletons form chalk cliffs. Though they are so tiny, they are of the greatest beauty when seen through the microscope, and these pictures show the wonderful little creatures as the microscope reveals them.

is the spot which his enemies attack. His one hope in life is, therefore, to win and retain a secure covering for his unprotected tail. He and the anemone seem to come to an agreement. The anemone affords him just the cover that he needs for his tail, and he in exchange rides the anemone about on his back.

The tentacles of the anemone are towards the nippers of the crab, and when he goes in pursuit of his prey, the anemone helps to kill it. The anemone has stings which paralyse or kill a little living animal. The crab has, therefore, a powerful ally to help him in killing his food, and as he eats, the anemone shares his meal. It is a profitable partnership. The crab gets his tail protected; he is largely hidden from his enemies; he is hidden, too, from the things that he desires to attack. The anemone is carried about, and is kept in constant touch with an ample supply of food. Thus we have a life partnership between the simple-looking plant animal and a desperate warrior who is continually battling.

SKELETONS OF THE LITTLE SEA WORKERS



The top picture is a group of the skeletons of very tiny animalicules called radiolaria. They are composed of a lattice-work of flinty matter, and they fall to the bottom of the deepest ocean and form what is known as Barbadoes earth. The lower picture is a part of the skeleton of one of their fresh-water cousins, called diatoms, magnified 4,000 times.

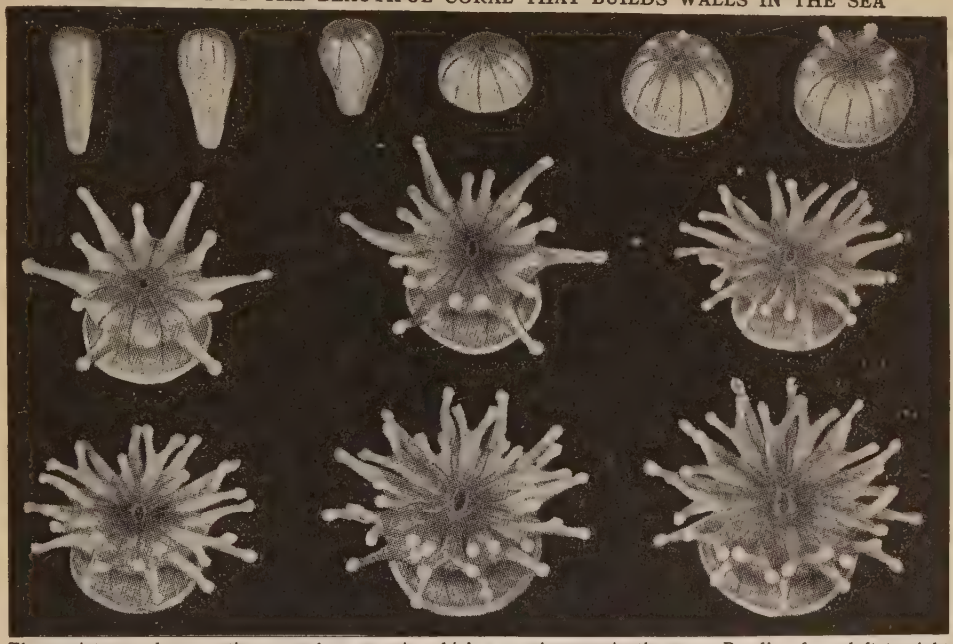
The study of anemones is a most interesting one, and one which we can all pursue, for they abound wherever rocks strew our sea-washed shores. There is no room for us to consider here the many species known, but the pictures in these pages show us some of the wonders and beauties of several famous specimens. Think of them not as plants, but as animals, of which the larger will swallow a quarter, or perhaps a shell the size of a saucer, and then divide into two living animals rather than lose the booty it has managed to secure.

The anemone is not the only sea animal with which the crab goes into partnership. There is a certain sponge in which he makes his home. We know that these things are not vegetables, but animals. They admit the sea-water through the canals in their bodies. From this they extract tiny forms of life for their food, and at the same time take for their breathing the oxygen which the water contains. That is the way fishes breathe. They have no lungs, except in rare cases, which we shall have to read about in a later story. They have gills, over and through which the sea-water washes. These gills take the oxygen from the water, and pass it into the blood-vessels, so that the fishes may breathe as we breathe. The method is, of course, very different, but the purpose and result are the same. Well, that is the way in which the sponge, no matter what its name or size, breathes and feeds and grows. We read more about them on page 4266.

In some of the channels running through the sponge may be found the hermit crab. Higher up in the same channel may be discovered a little shell, and also a little worm. In this collection we have the history of four forms of life. First of all the hermit crab pops his naked tail into the empty shell left by a growing whelk. Then comes a young sponge, sent forth on its life-journey by its parent. It settles upon the whelk-shell in which the crab has sheathed his tail. There

the sponge grows and grows until it quite covers the shell, but leaving open a channel by which the crab can enter and leave. Then as the sponge and the crab grow bigger they take into partnership a little worm, which is admitted into the interior of the sponge, simply that it may devour any refuse which may collect in the home of the crab. Even such humble things as crabs and sponges have to guard against unclean homes; they are as wise as, and more careful than, many human beings. And that is why we find the interior of the sponge occupied by a shell, a worm, and a crab.

THE GROWTH OF THE BEAUTIFUL CORAL THAT BUILDS WALLS IN THE SEA



These pictures show us the marvelous way in which a coral grows in the sea. Reading from left to right we see how the coral insect grows. First we see it when just born, and then gradually changing its form, shooting out more and more tentacles. The coral is the calcareous skeleton of the tiny animal.

Where the corals abound, fishes of the most brilliant color are always to be found. The fishes protect themselves by becoming colored like their surroundings, just as the animals do. But swimming with them are marvels of colored jelly, as they seem. They are the jelly-fish. We may all see jelly-fish at the seaside when the tide goes out. Better still, on a favorable day, we may see hundreds of them floating on the sea as we go by steamer. Those round our northern coasts look like white or transparent leaves, with a little dash of red in the centre, as though they had been darned with colored wool. We do not have the jelly-fish of brilliant color. They belong to the warm seas of the tropics. But the nature of all jelly-fishes is much the same.

Those of the tropics give off a brilliant silvery light at night, which helps to make the sea like a gleaming mirror of liquid metal. Ours are not so attractive. If we catch one and lay it on a piece of blotting-paper for examination, we have to be very quick with the examination, for the jelly-fish is composed largely of water, and it simply dries up before our eyes. They are not nice things to handle; they can sting very badly, as all sea-bathers know. The scientific name of the jelly-fishes and their kin is taken from the Greek word which means nettle, and sea-nettles is another English name for the jelly-fishes that sting.

By far the most alarming of the sea-nettles is the Portuguese man-of-war, or *physalis*. This looks like an inflated bladder, six inches long. Beneath it streams a number of organs, important to the animal in gathering and distributing food. The tentacles which we

By courtesy of the Scientific American.

most wish to avoid are those which carry the stings. These are intended to numb the prey of the physalis, but woe to the man who comes in contact with them. They flow out from the body of the animal some feet into the water, and are heavily charged with stings and a poisonous fluid. The merest touch from them will raise a white swelling on the hand, and for long afterwards the hand and arm experience an aching pain, which gradually extends to the muscles of the chest, causing some trouble in breathing. Even when they have been removed from the body of the physalis the stinging cables retain their power to injure, and from them issues a fluid which, after lying upon cloth for some days, has power still to sting.

The sea-anemones, the corals, the jelly-fish, and many other plant-like sea animals, all belong to the same family. We have another interesting family, including the starfishes, sea-urchins, sand-stars, brittle-stars, feather-stars, and so forth. Their very long name, which we need not bother about, means that they are enclosed in a tough skin in which calcium carbonate is deposited, so as to make the covering into a sort of shell without being a shell.

THE WONDERFUL STARFISH THAT WALK ALONG THE BOTTOM OF THE SEA

We have all seen hundreds of starfish at the seaside, and the pictures on page 1424 show us what the star-fish looks like to the camera. There is not a simpler, more innocent-looking thing to be found by the sea than the starfish, particularly that commonest of all, the crossfish, as we call the five-fingered one. Yet it is really a rather wonderful creature. Its organs are in the centre of its body, and the fingers branch out from that centre. Now, the fingers are really the legs, for there are tubular feet underneath them by means of which they walk as comfortably along the sea-bottom as we walk along the beach.

The starfish has a terrible appetite, and oysters, mussels, scallops, and other shell-fish are its food. It seizes its prey with its long and strong arms for fingers, and, no matter how powerful the shell may be, by persistent pressure the starfish manages to force it open, and eat the fleshy interior. Fishermen hate the starfish for the damage that they do, and, when they catch them, tear them in two and fling them into the sea. That is not only cruel, but also very stupid. Though you tear a starfish in halves, the animal may recover. Each of the two halves may heal and grow new fingers, and, instead of a dead starfish in two halves, you have *two* starfishes, fully equipped and very much alive.

THE SEA-CUCUMBER THAT THE CHINESE PEOPLE LIKE

The story of the sea-urchin we have already read, but we must remember that the picture that we see on page 1427 is that of only one of a numerous family of urchins. Sailors are glad enough to boil the urchin. They call it the sea-egg, and cook it in the same way as we cook the eggs of poultry.

What we call the sea-cucumber is, like all the other things we have been considering, an animal. Its other names are the sea-pudding, the sea-slug, and the trepang. It has the same sort of feet that the starfishes possess—suckers which protrude from tubes, and can get along over places which seem quite impossible to it.

The common name of the sea-cucumber suggests the idea which its appearance presented to those who bestowed the title upon it. The Chinese consider it a great delicacy for the table. There are many kinds of sea-cucumber, and the rarest fetch quite big prices. It does not sound quite nice to eat sea-slug, and we in this country are content to leave it to the Chinese, who like bird-nest soup, roast rat, and stewed puppy. But perhaps they consider the tastes of those who delight in turtle soup quite as strange as we take their own taste to be.

THE MYSTERY OF THE LOWEST FORMS OF LIFE IN THE SEA

We have now glanced briefly at some of the lowest forms of life in the sea. It is quite as wonderful as life among the higher animals. We do not expect much of animals that seem to be no more highly gifted with life than plants; but, as we have now seen, there is a mystery and fascination about these lowly creatures sufficient to make even the wisest men marvel at their habits.

THE NEXT STORY OF FISHES BEGINS ON PAGE 2477.

STRANGE FORMS OF LIFE BELOW THE SEA

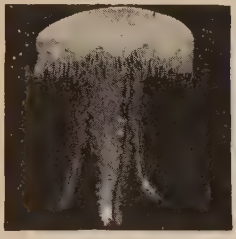
A colony of polyps.

Sea-pen formed of animals

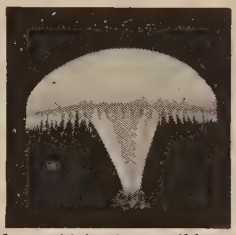
A Portuguese man-of-war.

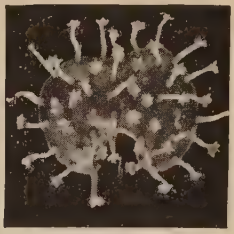
A colony of polyps.

White coral.



Two beautiful forms of medusa which sting terribly.



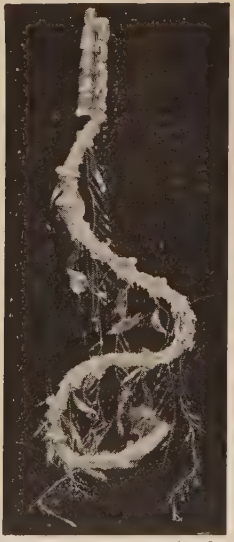


White coral.

A beautiful sea-nettle.

A jewled sea-slug

A sea-pen.



Colony of tiny sea animals.

These are photographs of animals living in the sea. Many of them belong to the sea-nettle family, stinging far worse than the nettle. A touch from the tentacles of a medusa will make a man ill all day, and he will feel the effects for weeks after. Strong winds sometimes drive them to our coasts, where they annoy bathers.

FRANCE AND HER MANY NEIGHBORS

Unlike Great Britain, France has many neighbors which actually touch her, as shown in this map. The map also shows the principal rivers and mountains of France, and from it we can see how much bigger France is than England. The place where the different countries join one another is called the frontier, and this is marked by a dotted line, though usually there is nothing to mark a frontier but an occasional post. This map shows that Alsace-Lorraine has been returned to France.

This is, perhaps, the most famous square in Europe. In the days of the Terror it was called the Place de la Revolution; but it has now been named the Place de la Concorde, or the Place of Peace.

FRANCE IN MODERN TIMES

CONTINUED FROM 2291

THERE are many famous sayings about that beautiful country, "La Belle France," that have come down to us from the lips of those who knew her in the far past. Let us take two of them, that all French children know well, as a guide to our picture of France of modern days.

There was a learned and brave Dutchman named Grotius, who spent much time in France during the reign of the good King Henry IV. and his son—about the time of Queen Elizabeth. When Grotius was asked what he thought of France, he answered earnestly: "France is the most beautiful kingdom there is—after the Kingdom of Heaven."

Then, again, hundreds of years before Grotius said this, there was an old traveler and geographer named Strabo—the first, as far as we know, who tried to give an interesting account of countries, not a mere list of names—who wrote with enthusiasm, when France was still Gaul, about the grand mountain masses in the south and south-east, about the fine spreading rivers, about the seas brought near by a protecting God. "Gaul," said Strabo, "must one day be the most flourishing place on earth." Now let us try to find out what was in the mind of Strabo when he spoke of the bounding seas, the mountain masses, the spreading rivers, and their influence on the future greatness of the country.

It is a wonderful point in the position of France that, though part of a great continent, it has many of the advantages of an island. It can send ships direct across four seas. By way of the North Sea it can trade easily with Germany and the Baltic countries; across the narrow Channel, which the French call La Manche—meaning "the sleeve," from its shape—it has constant and quick communication with England. France is so near to England that more than once the possibility of making a tunnel under the sea from Dover to Calais has been discussed. If this were done trains could carry passengers and goods from either side as easily and quickly as from London to Dorking, or any other journey of twenty miles.

At present one must face a sea voyage, often very rough and unpleasant, lasting about an hour, for they still depend on the service of the various steamer routes which act as links to bind not only England and France closely together, but England to the whole continent of Europe, and to the great

Eastern world beyond. But this communication with the narrow seas is not all. The ports on the west of France face the great Atlantic highway to the New World; and the blue Mediterranean on the south carries not only the commerce of all South Europe and North Africa, but also the fleets of ships taking the direct line to the East by way of the Suez Canal—that first wonderful ship canal, built by a Frenchman.

THE BOUNDARIES OF FRANCE BY LAND AND BY SEA

But France has land frontiers as well as the ever restless, hungry seas. There are the snow-tipped Pyrenees, stretching from the Atlantic to the Mediterranean, still keeping guard between France and Spain. It was in vain that Louis XIV. cried out so triumphantly when his grandson came to the throne of Spain: "The Pyrenees are no more," for the white peaks still look down over the grand passes and green slopes, where shepherds tend their flocks, to France on the north, to Spain on the south.

Thousands and thousands of valuable and heroic French lives have been spent through the centuries in guarding or in trying to extend the land frontiers on the east of France, from the days of Charlemagne to the present day. In many parts, especially in the low lands of Belgium and on the wooded sides of the Vosges Mountains in Germany, the battlefields lie too thick to count. The Jura Mountains separate France from Switzerland, and the great mass of mountainous land south of Lake Geneva lies between France and Italy. This grand country is the western end of the highest land in Europe, which stretches right across Switzerland and the Tyrol to the Danube. The highest peak, Mont Blanc, the white mountain, is in France, and is three and a half times as high as Ben Nevis.

THE FOUR COUNTRIES THAT FRANCE TOUCHES ON HER EASTERN BORDERS

Here, then are the four countries which France touches on her eastern borders—Belgium, Germany, Switzerland, Italy. On these frontiers were forts and strong towns, and thousands of soldiers were massed in silent watchfulness, even in the days before the Great War broke out. But these frontier barriers were in truth the great outlets by which France was connected with the very heart of Europe. All day and all night trains pass uninterruptedly over the frontiers, from Paris, Lyons, Marseilles, and other great junctions, carrying passengers and goods to every capital and every centre of industry in the wide continent. Lines run down into Spain, by each end of the Pyrenees, near the sea-shore, and even the massive Alps are now no barrier as they were of old; for French skill has pierced the tunnel of Mont Cenis, and the train quickly passes from the land of dazzling snow and glaciers to the land of dazzling sunshine, gay flowers, and blue lakes.

Now, the size of this country thus bounded by sea and land is nearly twice as large as that of Great Britain. The whole of France lies in the middle of the temperate zone, half-way between the icy cold of the North Pole and the burning heat of the equator. Added to the advantage of the moderate climate that this position gives it, it is also neither too damp nor too dry, for the west winds—like those that help England's dairy farming and cotton industry—bring plenty of rain, which in turn is dried up by the land winds from the north-east.

THE GREAT GROUP OF HIGH LANDS IN THE CENTRE OF FRANCE

But we have spoken only of one of the mountain masses mentioned by Strabo. The other is the great central group of high lands which the French call the "Massif Central." This is the most prominent feature in the country, and goes far to make the face of France what it is. The valley of the Rhone separates the "Massif Central" from the "Massif" of the Alps, and a narrow plain separates it from the great chain of the Pyrenees. The Massif Central is not nearly so lofty as the Alps and the Pyrenees, being more nearly the height of the Jura and the Vosges; but it extends over nearly a fifth part of France, forming a most wonderful and beautifully varied country in the old province of lovely Auvergne. The chain of the Cevennes, rising from the Rhone valley, forms part of this central plateau of high land.

In the mountains of Auvergne, we see the fantastic shapes of the old volcanic peaks, which ages ago poured out streams of fiery lava, and clouds of stones and ashes. To-day their "mouths" hold dark lakes, or cattle feeding on soft,

THE GAY AND BEAUTIFUL CITY OF PARIS

No big city in Europe is more beautiful than Paris, with its palaces and churches and public buildings, of which the people are justly proud. Here we have a general view of the city as seen from the Louvre, once a palace, now a famous museum. We are looking along the River Seine towards the cathedral of Notre Dame.

Paris abounds in places of amusement of all kinds, and the leading theatres receive a large sum of money every year from the Government towards their support. It cost over five million dollars to build the lovely Opera House shown here. Standing in the heart of Paris, it is one of the great glories of the capital.

Paris has been made beautiful by being built according to a plan, instead of growing up through centuries, as London did, and this view of the city, taken from the top of the triumphal arch erected to Napoleon, shows how splendidly its builders have laid out its fine, wide streets and avenues, planted with trees.

rich, green grass. The bare, bold granite heights, and deep rifts in which the rivers run 1,500 feet below, make a fine contrast with the fertile lower slopes and valleys. It was in the quiet, smiling valleys of the Cevennes that some of the bitterest persecutions of the Protestants took place in the bad days of Louis XV.

THE GREAT SPREADING RIVERS THAT RUN THROUGH THE VALLEYS OF FRANCE

And now we come to the "spreading rivers." From the great and varied Massif Central, the face of France slopes gently towards the Channel and the Atlantic, forming the vast plains of the north-west and the south–west. Towards the Mediterranean, the slope is steeper. In the large plains lie three out of the four great river systems of France, which spread over it like the veins of leaves; they are the Seine, the Loire, and the Garonne. The hills that rise on the immense plains serve but to give a gentle rise to the otherwise flat country, and to guide the courses of the numerous streams and rivers.

We have already glanced at the Rhone, the most rapid of French rivers, in the part of its course between the Alps and the Cevennes. It rises in the snows of Switzerland, passes through Lake Geneva, and soon after turns sharply south, as it receives the slow Saône from the Vosges. In the angle formed by the meeting of the two rivers lies the great city of Lyons. The Rhone valley has always been the chief highway between the north and south, from the days when the Roman traders and soldiers pushed their way through the forests and swamps to the time when the Marseilles battalion marched to Paris, as told on page 2284, and the Paris and Marseilles coach lumbered along from town to town, after the fashion of our own coaches in the beginning of the last century.

THE LONG RIVER LOIRE AND THE SEINE THAT WINDS SLOWLY TO PARIS

The Rhone forms a marshy delta where it joins the Mediterranean, and there are sandbars across its mouths. Marseilles, the greatest port in France, lies to the east of the delta on the stormy Gulf of Lions—so named after the violence of the storms, not after the city of Lyons.

The Garonne is the other great river of the south, rising in the Pyrenees, and collecting on its right bank numbers of streams from the mountains of Auvergne in the great central highlands. Its waters pour into the Atlantic through a wide and long mouth, called the Gironde, below Bordeaux.

The Loire, the longest of French rivers, three times longer than the Thames, flows in a great semicircle from the Central Mountains, joined on its way by many tributaries; its waters also pour into the Atlantic. Both the Garonne and the Loire are subject to great floods, and dykes are built in many places to prevent the waters bursting over the plains. It is a sad calamity when the flood proves too strong. The fields then all lie under water, and in towns people have to go about in boats; often many are drowned, and their homes destroyed.

The slow, winding Seine—its name means the Tranquil—rises in the hills on the right bank of the Saône, and, joined by the Marne at Paris, flows through Rouen, to the chief port of North France, Le Havre, on the English Channel. It carries more merchandize than any of the other great rivers.

THE WATERWAYS THAT BEAR GOODS FROM ONE END OF FRANCE TO THE OTHER

It is reckoned that France has 150 rivers on which boats of various sizes can carry goods a long way inland, which is a great advantage, as so much of this solid-shaped country is far from the sea. But there are, besides these rivers, hundreds of miles of canals, some connecting or improving the different river systems, some joining the Atlantic and the Mediterranean by the valley of the Garonne, some joining the Rhone, above its delta, with the sea. And so it is that many kinds of heavy goods, for which there is no hurry in transport, can be carried by water from one end of the country to another.

Sometimes the canals go through tunnels in the hills, sometimes they are carried by aqueducts across valleys. It is a strange sight to see a barge with sails crossing by an aqueduct high up in the air. On and on these barges go, on their "inland voyage," day after day, generally drawn by a horse, sometimes taken in tow by a launch, past the banks of blue forget-me-nots; past the groups of laughing children in blue smocks and

PICTURESQUE PEOPLE OF FAIR FRANCE

A fisher-girl of Picardy

A girl of Provence

A Normandy fisher-woman

Peasants of the country round Paris; from "The Gleaners," by the French artist, J. F. Millet.

A Bernardine nun digging

A northern prawn-fisher

A woman of Brittany

The people of different parts of France are very unlike one another. We can see, from the pictures of women of Provence and Normandy, that not only the costumes but the types of faces in the north and south are quite distinct. In Brittany the people speak a different language from the rest of France. The photographs on these pages are by Messrs. Mansell, Valentine, and the E. N. A.

pinafores, looking like large forget-me-nots themselves; through the cornfields and the orchards and the vineyards and the fine farms so carefully tended; past the villages and the castles, the towns and the great cathedrals.

WHAT THE CHILDREN SEE FROM THE BOATS AS THEY SAIL ALONG

Truly, the families of the bargees can learn what is grown in France, what the people do in France, without looking in books. They see that wheat is grown nearly everywhere, for France generally produces in her great plains more than any other country, except the United States and Russia, and many thousands of men and women work in the fields to raise it, in the mills to grind it, in the barges and trains to carry it where it is needed. Still, there is not enough to feed all the people, and more must be brought from other countries.

The bargees, too, see much of the vineyards all along the courses of the Loire and the Garonne, and in the district east of Paris, called La Champagne. There are also great numbers of vineyards all along the Saône and the Rhone, and on the Mediterranean coast. France not only uses a great quantity of wine at home, for it is much cheaper than with us, but sends away all over the world many different kinds. Thousands of workers gather and press the grapes, make casks and bottles, and attend to all the various processes necessary before the wine is ready.

In the valley of the Rhone also grow mulberry-trees, which feed great numbers of silkworms, and at Lyons and in the neighborhood are factories, which send out their famous silks, satins, ribbons, velvets, to every country where fine materials for clothes and furnishing are needed. The factories also get supplies of raw silk from Italy and from the East.

THE COALFIELDS AND THE FACTORIES THAT THEY FEED WITH POWER

Round the edge of the central highlands are coalfields, of which the largest, St. Etienne, near Lyons, supplies the silk factories. As some iron and other metals are also found here and there about the same districts, there are various industries carried on, such as the making of tools and machinery. But the canals, and railway lines, too, lie thickest in the north-east of France, and many barges used to pass to and from the largest coalfield of the country, situated on the borders of Belgium. France only produces two-thirds of the coal needed in the country; the rest she buys from Great Britain and the United States. She also had to buy iron and other metals needed at Lille, the chief town of a large district of tall chimneys and black smoke, with a deafening whiz and whir of machinery, and crowds of workers, all reminding us of manufacturing centres at home. Here were iron and steel works, and linen and cotton factories. These industries are carried on all along the north-eastern frontier, Nancy and Belfort being particularly famed for cotton and metal works. Many factories were destroyed during the Great War.

The raw cotton from America and other places comes to Le Havre, at the mouth of the Seine, which is often called the Liverpool of France, and from it are supplied Rouen, the Manchester of France, where there are many cotton factories, and also the rest of the cotton towns in the north and east.

THE MAKING OF THE THINGS THAT FILL THE SHOP WINDOWS IN PARIS

The linen from these districts is made chiefly from flax grown in the fields of the north. Great quantities of the blue cotton and linen materials worn so much in France are made in these mills. To supplement the wool of the sheep grown on the Ardennes and in French pastures, supplies come by way of England from Australia and New Zealand, and from South America, to feed the various woolen factories of the north and east.

From the old decaying granite of the Massif Central come kaolin, from which the finest china is made, though sometimes it is found easier to bring this special white clay up the Seine from the granite of Cornwall and Norway. At Sévres, near Paris, and at Limoges near Auvergne, most beautiful china is made. The French are particularly skilful in painting the shining surface. They also make very pretty peasant pottery, which costs about as many cents as the fine china does dollars.

But to see samples of the numberless things made in France, we must look into the shop windows of Paris. Thousands of other nations go to Paris—it takes only seven and a half hours from London—and everyone can find something of interest and delight in this

TWO FAMOUS OLD CITIES OF FRANCE

The greatest commercial city of France is Marseilles, on the Mediterranean Sea, built on slopes overlooking the old harbor seen in this picture. Crowning the hill is the church of Notre Dame, which sailors like visiting. It was from Marseilles that men and women marched to Paris and largely influenced the cause of the Revolution, as told on page 2284. Monte Cristo's Island lies a few miles off the Port of Marseilles.

While Marseilles is the third great city of France, the city of Lyons comes next to Paris, and is the second. Its great extent may be seen from this birdseye view. It is built where two rivers, the Rhone and the Saône, meet, and the most important part of the city is on the narrow strip between these rivers.

splendid city. There are less than half as many people in Paris as in London; the river running through the city is clean, and there are scarcely any fogs.

THE TREASURES OF PARIS AND THE PLEASURES OF ITS STREETS

Visitors who love history can find endless pleasure in wandering about the streets and squares, the bridges and palaces, where great events moved so quickly a hundred years ago. Those who love art can find splendid treasures in the museums and galleries. And as for the shops, besides the china, there is the wonderful and costly lace made in various parts of the country, the finest muslins and cambrics, the brocades and velvets from Lyons, the cloths from Amiens, the clocks and jewelry, of which a good deal is made in the neighborhood of Paris, as well as the thousands of things that people buy for presents. Paris fashions in clothes are famed all the world over, and dressmakers and milliners come from other countries to find out what is going to be worn, and to copy the latest and smartest styles for their customers at home.

From this rich and beautiful city of Paris—one is apt to forget the great lines of fortifications round it, making it the largest fortified camp in the world—radiate not only the great roads of France, but nearly all the chief railway lines; for Paris is the very centre of the trade and industry of France, a sort of living heart, whose pulse-beats are felt to the farthest frontiers by means of the great arteries of roads, waterways, and railways. A railway train requires only about five hours to reach Lille and the district of which it is the centre, from Paris, and the lines pass on through Belgium and Germany to Holland, Austria, Russia. Another branch of the railway passes through Amiens, where we may see the most perfect cathedral in France, to Boulogne and Calais.

THE RAILWAY FROM PARIS TO THE SEA, AND THE SHIPS AT MARSEILLES

The east of France down to the Mediterranean is served by the Paris-Lyons-Mediterranean Railway. The main line follows the old route through the Rhone valley, passing Lyons and Avignon, where the splendid palace of the Popes still speaks of the times when this city and its neighborhood belonged to the Roman Church. Marseilles itself, the queen of the south, is a great world-port; every language is heard in its streets, from the sailors who bring ships there. Marseilles is one of the chief markets in France, and has factories for tile-making, soap, and oil. Through Marseilles passes French trade with the Far East, with the New World, with Africa, and, nearer still, steamers link it to the island of Corsica, about half the size of Wales, which passed to France from Italy the year before the birth of its greatest son, Napoleon Bonaparte.

Thousands of Americans pass through Paris and Marseilles, not only on their way to Egypt and the East, but to spend the winter in the beautiful coast district between Marseilles and Italy—the Riviera. They leave fogs, snow, and cold winds behind in their own country, and in the course of a few days—fourteen hours from Paris to Marseilles—pass to warm sunshine in a bright, clear air, under a blue sky, and can sit out of doors, facing the blue sea, enjoying the scent of roses and the sight of brilliant patches of geraniums, as well as the beauty of orange and lemon orchards and olive groves.

THE SPLENDOR OF THE OLD TOWNS OF SOUTHERN FRANCE

Nice is one of the largest and most fashionable of the Riviera towns, and all nations of Europe gather here to find health and to amuse themselves. Fine scents and soaps come from this part of France and the best salad oil from olives.

The line of the south does not run to Paris, but connects the Atlantic with the Mediterranean, along the valley of the Garonne and its canals. There are towns in this part of France of surpassing interest. Toulouse is a splendid city of churches and mansions, with a museum and a fine library. It is at the meeting of the ways for commerce and industry of all kinds. Carcassonne is also on this line, and on the canal of the south; its strong walls still tell of its importance in the old days when it was the key to the narrow passage between the Massif Central and the Pyrenees. The wonderful cathedral of Albi, so lofty and grand, is but one among the great number of cathedrals found all over France, the undying glory of those who built them in the Middle Ages, and the delight of all who in later days love art and architecture.

To go from Cette, on the Mediterranean, to Bordeaux, the great wine port of the west, takes eleven hours of railway traveling, and lines branch off to many health resorts in the Pyrenees, and to Spain. Bordeaux is reached from Paris in about ten hours, passing Orleans, Tours — the garden of France — and Poitiers on the way.

Normandy and Brittany are served by the railway of the west. Cherbourg, the great naval and military port of the Channel, on the bold Cotentin peninsula, is reached in eight hours from Paris. Many German and English liners touch here on their way to and from America. Like Plymouth, it has a great breakwater to protect its harbor. Another naval and military port, Brest, on this line, at the extreme west of France, is five hours farther from Paris.

NORMANDY AND BRITTANY, AND THE GREAT SEAPORTS OF FRANCE

Le Havre, the second port in France, is about six hours from Paris by rail. The tall lighthouse above the town looks down on a busy scene of ships and docks, for the Seine is the great northern door into the country, and by it goods are taken to Rouen, and to distant Paris. We can see the cotton for the factories unloaded on the wharves of Rouen, under the shadow of the great churches for which it is so famous. And on the heights overlooking the windings of the "tranquil" river, in the fine, wide valley, stands the statue of Joan of Arc.

English people travel much in Normandy, which is so close to England; the seaside places are charming, and the long, tree-bordered roads are good for cycling. The cathedrals and churches are full of interest, and the apple orchards are a beautiful sight in their white spring dress. It is most interesting to watch the cider being made in the presses by the roadside in autumn. Over the wide-spreading valleys, in both Normandy and Picardy, grow fields of beetroot, so much used to make sugar; also great quantities of potatoes, largely sent to England. From Le Havre pass out millions of eggs, and tons of butter and cheese from the dairy farms of the north. A gay sight it is on market days in Normandy and Brittany, when the country folk crowd into the towns to buy and sell. Such pretty white caps and shining ornaments there are, such red and blue umbrellas, glowing brass pots full of milk, and such loud, animated talking. The serious-looking babies in close white caps seem the only quiet people.

THE CLATTER OF THE CHILDREN'S SHOES, AND THE BLUE SMOCKS AND BLOUSES

Perhaps the first morning you wake up in France you will wonder what causes that clatter, clatter, clatter over the stones. You look out and see merry little crowds of children, boys and girls, in blue smocks and blouses, the girls with hair very neatly plaited, all hastening to school, with their satchels on their backs. The clatter is from the wooden shoes, or sabots, that many of them wear. They are like the clogs of the Lancashire mill-workers, whose ancestors, it is said, got the pattern of the clogs from the French Huguenots, who did so much to help on the spinning and weaving in England when they left their native land for that country.

The French care a great deal about education, and have built fine schools all over the country. There are all sorts of schools, and all have an equal chance of getting the teaching their brains are best fitted to grasp. Every Frenchman over twenty-one shares in the government of the country.

So the greatest trouble is taken to teach the children to be good citizens, and to know their mother country well, her resources and her needs, and to understand what their brothers and sisters are doing in the eighty-six departments of France. Those departments were formed at the Revolution from the old provinces, so that the same fair laws and government should prevail equally all over the country.

DIFFERENCES IN LANGUAGE AND CUSTOMS IN FRANCE

You see, therefore, that the French people are descended from almost as many races as there are now represented in the United States and Canada. Their descendants have of course mingled together and become one people; but they have many different characteristics in the different parts of the country. If we were to travel down the coast of France, we should find that the inhabitants of Normandy, which was peopled by the Northmen, are not at all like the people of Brittany, which was settled by the ancient Britons, and the Gascons, who live on the shore of the Bay of Biscay, at the foot of the

Pyrenees, which made the last stronghold of the Iberians, have a special character of their own. In the matter of language there are still great differences. Originally all these people spoke different languages and the dialect, or patois, of one part of the country is still quite distinct from that of other parts. Although French is, of course, taught in the schools the people of Brittany still speak their old language, which is the same as that of the Welsh, and indeed if a Welshman and a Briton were to speak to one another in their native languages they could understand each other. The people in the North, near the Belgian frontier, are very like the Belgians, and are quite different from the people of Marseilles and Avignon, and the people of these towns differ from the peasants of the "Landes," near Bordeaux, where the herdsmen walk about on stilts in the damp, heavy sands of the plain on which they pasture their flocks and herds and their geese.

It is natural that all these people should have had different ways of living, and many quaint superstitions and customs still survive. These customs are slowly dying out, however, and before long most of them will have disappeared.

But in spite of all their difference there is one point on which there is no lack of unity among the French people and that is their intensely passionate love of their beautiful country. The instant she is attacked, from north and south, east and west, they rise as one man to defend her. They will bear any privation, and are ready at any moment to sacrifice themselves and all they have for her sake. In time of peace, every man who reaches the age of twenty, unless he is unfit either because he is not strong enough or because there is something wrong with his mind, must serve in the army. The term of service is three years, and from this full term there is no escape.

MANY PEASANT OWNERS OF THE LAND IN FRANCE

Though there are many large cities in France the people do not readily take to town life, and nearly half the population is engaged in agriculture. Much of the land is owned by the peasantry, who hold farms of from five to fifty acres, and the man who owns fifty acres of good land is very well off indeed. On these small farms a good deal of work is done by hand, and in some places agriculture is still very primitive. The people are slow to give up their old ways, but of late years new machinery has been introduced, the state supports agricultural schools and colleges, and improved ways of farming are taking the place of the old.

Even in the manufacturing parts of the country, the people are not prone to gather into the large factories. Many of the beautiful textiles that come to us from France are made by cottage workers, some of whom, since the introduction of electricity, have been able to increase the amount of their business by using the new power looms.

The people, as a rule, live simply, and as the French are as a general thing very thrifty, most of them are able to save. Their thriftiness sometimes becomes miserliness, but there are few, even among very poor people, who are not able to lay something away for their old age. It is because of the thrifty habits of the whole people, that France has again and again been able to turn disaster into prosperity.

We must not let ourselves think, however, that the French devote themselves only to farming and manufactures. Among this great people there are not only some of the greatest painters and sculptors, architects and writers in the world, but France has also given to the world some of the greatest scientists and philosophers of all time and of our own day. You will find some of their names mentioned with honor in the BOOK OF MEN AND WOMEN.

HOW THE PEOPLE OF FRANCE ARE GOVERNED

Although France is a republic, the government is not quite like the government of the United States. In some ways it is more like the government of England. The president is elected for seven years, and he may be re-elected for a second term, but he has not very much real power. He sends his messages to the legislature in writing, although every recent president has been a member either of the Senate or of the Chamber of Deputies, and does not lose his seat on his election to the presidency. He has the power to negotiate treaties, and even in some cases to ratify them, but they must in all cases be reported to the legislature as soon as possible, and he cannot declare war without the consent of both the

houses. He has the power to dissolve the Chamber of Deputies, but only on the advice of the Senate, and every one of his acts must be signed by a minister. He also has the power of pardoning offenders against the law.

You see the power of the president is well hedged round. The real ruler is the prime minister. Since the date of the Constitution, however, no prime minister has ever stayed in office during the four years for which the Chamber of Deputies is elected.

The Constitution does not decree that the members of the cabinet must be members of the legislature; but as a matter of practice, the majority of them are. The Minister of War is usually an officer in the army, and the Minister of Marine an officer in the navy. Sometimes the Minister of Foreign Affairs is called in from the outside, but the rule is that the other cabinet ministers are either senators or deputies, and under the Constitution they are responsible to the legislature for their acts. If the majority of the Chamber of Deputies does not uphold the cabinet on any question, the prime minister is expected to resign. The president then appoints a new prime minister, who proceeds to form a new cabinet. Each appointment must be signed by a minister as well as by the president, and when the ministry changes, a member of the old cabinet stays in office long enough to sign the appointment of the new prime minister.

Changes of ministry have happened so often that a government sometimes goes out of power before a year has passed, but the president cannot be put out of office before his term has expired unless he is impeached by the Lower House, tried by the Senate and found guilty. One president, however, who became very unpopular, was forced to resign because he could find no one to serve in his cabinet.

The legislature is composed of two houses, the Chamber of Deputies and the Senate. The deputies must be twenty-five years old, are elected by manhood suffrage vote and serve for four years. Members of the Senate are elected by the deputies of the department that they are to represent, the members of the council of the department, the members of the local councils, and a delegate from each commune, which corresponds somewhat to our township. Each senator serves for a term of nine years, but one third of the Senate is elected every three years, so that the whole body never goes out of office at one time. For the election of the president, the two houses sit together in what is called the National Assembly, and the candidate who receives the majority of their votes is elected. He receives about $120,000 a year as salary, and as much more for expenses. He is also provided with an official residence by the state. The senators and deputies are each paid the same salary of about $3,000 a year.

There is nothing in France that corresponds to the state or provincial government of the United States and Canada. The councils of the departments are appointed by the government, and so are the governors, who are called prefects. Each department is subdivided into arrondissements. The councils of the arrondissements are elected; but these councils are presided over by sub-prefects, who are appointed by the government; and the council has to do with little except local taxation. The councils of the commune, which transact local affairs, are also elected and these local councils are presided over by the *maires*, who are also the local police officers, and are directly responsible to the government, for maintenance of the laws by the people.

THE GREAT COLONIAL EMPIRE OF THE FRENCH

France has a great colonial empire. In Africa, as we read in the story of that continent, Algiers and Tunis, the Desert of Sahara, and a great part of the fruitful western coast are under her rule, and part of Morocco is under her protection. She has large possessions in the Congo, Madagascar belongs to her, and she owns part of Somaliland on the Red Sea.

In Asia, she has large possessions to the south of China, and in America, she still holds part of Guiana on the northern coast of South America, a few of the West India Islands, and the small islands of St. Pierre and Miquelon off the coast of Newfoundland.

FRENCH PEOPLE ARE NOT GOOD COLONISTS

But the love of country is so intense among the French that they do not will-

ingly go abroad even to their own colonies, and consequently the colonies are not prosperous. They do a good deal for the education of the native people of the colonies, but they do not go to live there. This is true of even Algiers and Tunis, which lie across the Mediterranean, almost at the door of Southern France. These two colonies, however, come nearer to being prosperous than any of the others. The climate of both is delightful. They can be made true garden spots, and already they provide quantities of early fruit, flowers and vegetables for the markets of Northern France and England.

Perhaps one of the reasons why the French are not enthusiastic about going to live in their colonies is that they have not been forced out by the necessity of earning a living. The population of France has been at a standstill for many years, and until her people increase in number, she cannot send out many strong, young men to make her colonies prosperous children of the motherland.

Since the time of the Franco-Prussian War, France has gained steadily in importance, and has become a great power in the councils of the world. Since the time of Napoleon III France and England, who had for so long been enemies, have been friends, and the agreement between them has helped both. Once it seemed as though they might quarrel over Africa. As we read in the story of Africa, a French captain, named Marchand, tried to establish French possession in the Sudan and cut communication between Egypt and the Upper Nile. For a while it looked as though the French legislature would uphold him, in which case there would have been war, but happily for the world, wiser counsels prevailed. Later all the old sources of contention between the two nations were removed, and the friendship between them became stronger as time went on.

Twice within a few years afterward there was danger of a quarrel with Germany, over Morocco, part of which had been drawn under French influence; but in each case the other powers took the part of France, Germany was forced to give way, and the trouble passed over.

At home, there were many quarrels. Education, which had always been in the hands of the religious orders, was taken over by the state, most of the orders were dispersed, and the care of the church buildings was taken from the clergy, and all this created much bad feeling. There were many political difficulties and some bad strikes; but on the whole the country was peaceful and prosperous. Commerce and manufactures increased, great dominions were gained in Africa, science and education advanced and friendship with other nations was cultivated. The friendship between France, England and Russia became so close that it was called an *entente cordiale*, and the alliance which had been signed between France and Russia provided that if either nation were attacked the other would come to its rescue. There had been disputes with Spain over Morocco, but these had been settled, and good feeling between Italy and France, which had had several disputes over territory in Africa, grew up.

THE BEGINNING OF THE GREAT WAR

In 1914 France presented the picture of a civilized, cultured nation, at peace with all the world. But in that year Germany, which was about to go to war with Russia, invaded France and the Great War which plunged the whole world into war began.

After the Belgian forts had been taken, the German armies swept on and almost reached Paris. There, on the Marne River, they were defeated in September by the French armies under General Joffre, aided by a small English army, which had been sent over, but it was impossible then to drive them entirely out of France. During the next four years some of the bloodiest fighting the world has ever seen took place on French soil. Finally, when British, Portuguese, Italians, and, at last, Americans as well, were arrayed alongside the French, the strong German lines were broken, and their discouraged leaders asked for peace, which was finally signed June 28, 1919. By the terms of peace, France received back her old territory of Alsace-Lorraine, which had been torn away in 1871, and also partial compensation for the destruction of the war. The northeastern part of France, where were most of the great factories, had been under German control for four years, and the sufferings of the people can never be told.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 2549.

WHAT THIS STORY TELLS US

A WORLD without fire would be a world of savages. How men first got fire we do not know. Perhaps it was from a volcano, or from a fire set by lightning. At first, after men had learned the value of fire, they did not dare let it go out, and when they moved from one place to another, they carried burning coals with them. Next they learned to get fire by rubbing pieces of wood together, and then by sparks from flint and metal. Next came rude matches, which were expensive and dangerous, but which have been improved until we can now carry them in the pocket with perfect safety, and can get fire in a moment without trouble. The story and the pictures show you how matches are made by the million from logs and a few chemicals. If you will follow the story you can see why it is now possible to buy a thousand matches for a few cents. Made by hand, they would be very expensive, and we should have to think twice before using one.

HOW MATCHES ARE MADE

CONTINUED FROM 2337

IF you were ever on a picnic, or in camp, and suddenly found that the matches had been left behind, or had got wet and refused to strike, you quickly realized how much we depend upon these little pieces of wood with their crackling heads. They are so common and so cheap that we often forget what a convenience they are. Yet the world got along without matches for thousands of years; for the first real matches, something like those we have to-day, were made less than a hundred years ago.

When our ancestors first began to use fire to cook their food or to keep them warm, a central fire was kept burning all the time, so we are told. Certain persons were appointed to tend it, and see that it did not go out for want of fuel, or because of the rain. From this central fire the different families would take a burning branch to kindle separate fires to cook their food. When the tribe moved the fire was carried along too. It is not strange that many savages worshiped the dancing tongues of flame, which were so mysterious and so terrible and yet so useful.

HOW OUR ANCESTORS MADE FIRE WITHOUT MATCHES

We know that some savages used to get fire, and still get it, by rubbing two pieces of dry wood together in different ways. This method is difficult, and not every one can learn the knack of doing it. Men found an easier way after they learned the use of iron and steel. If a flint is struck sharply on a piece of steel, sparks fly off, and will set some very dry substance on fire. The muskets used in the Revolutionary War were called flintlocks, because they used this idea. A little hole was bored through the barrel, and a few grains of powder were shaken out on the edge. A flint attached to the hammer, or lock of the gun, struck a piece of steel, when the trigger was pulled, and the sparks set the powder outside on fire, and the flame exploded the powder inside the barrel.

WHAT IS MEANT BY A TINDER-BOX, OR FLINT AND STEEL

During the pioneer days, and long afterwards, many houses had tinder-boxes, which contained some flints, a piece of steel, and some rags which had been baked until they were very dry. When a fire was wanted, sparks were struck into a bit of the tinder, as the half-burned rags were called. This would smolder, and, by blowing, tiny splinters could be lighted and soon there would be a roaring fire of logs in the great fireplace. Sometimes very dry rotten wood was used instead

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of tinder. You may have seen a piece of punk, which holds fire a long time. Usually, however, the coals were covered with ashes at night so that they would keep alive. Sometimes this was forgotten, or perhaps the family went away from home for a few days, and the fire went out. If the house did not own a tinder-box, or if there was no tinder prepared, some one took an iron pot and went to a neighbor's house to get some live coals.

How matches got rid of all this trouble

Now we get rid of all this trouble by using a match, and do not care very much if we must use two or three. This has not been true very long. The first matches made were very expensive, and were considered a great luxury. Your grandfather or grandmother can tell you of the time when either there were no matches, or when they were too scarce to be used freely.

A man named Godfrey Haukwitz almost made a match as long ago as 1680. In 1805, a man in Paris coated bits of wood with sulphur and tipped them with a little chlorate of potash mixed with sugar. When he wanted a light he dipped the tip into a bottle of sulphuric acid, and the combination caught on fire. Sulphuric acid, however, will eat through clothing, or burn the skin, and so this plan was found to be too clumsy and too dangerous for common use. The next matches were made in another way.

The first real matches were made by John Walker, an Englishman. They were tipped with antimony and potash, and with every box a sheet of folded sandpaper was furnished. The match was placed in the fold, which was tightly pressed together with one hand, and the match was jerked with the other. Sometimes the match caught on fire. You know that rubbing or friction produces heat. This is the secret of the match, to find some substance or substances which will flame from the heat produced by rubbing against a rough substance and yet will not be too dangerous to use. Some of these early matches are shown on pages 810 and 811.

Phosphorus, which flames at a low heat

Phosphorus had been discovered long before, but it catches on fire with very little heat, and was thought to be too dangerous to use for this purpose. It is poisonous besides. It was found, however, that by mixing the phosphorus with other substances, a match could be made that would strike easily and yet was not likely to flame unless rubbed purposely. Several men found this out about the same time, for we find this same John Walker, and men in Germany and Austria making phosphorus matches in 1833. Matches were made in Springfield, Massachusetts, in 1836.

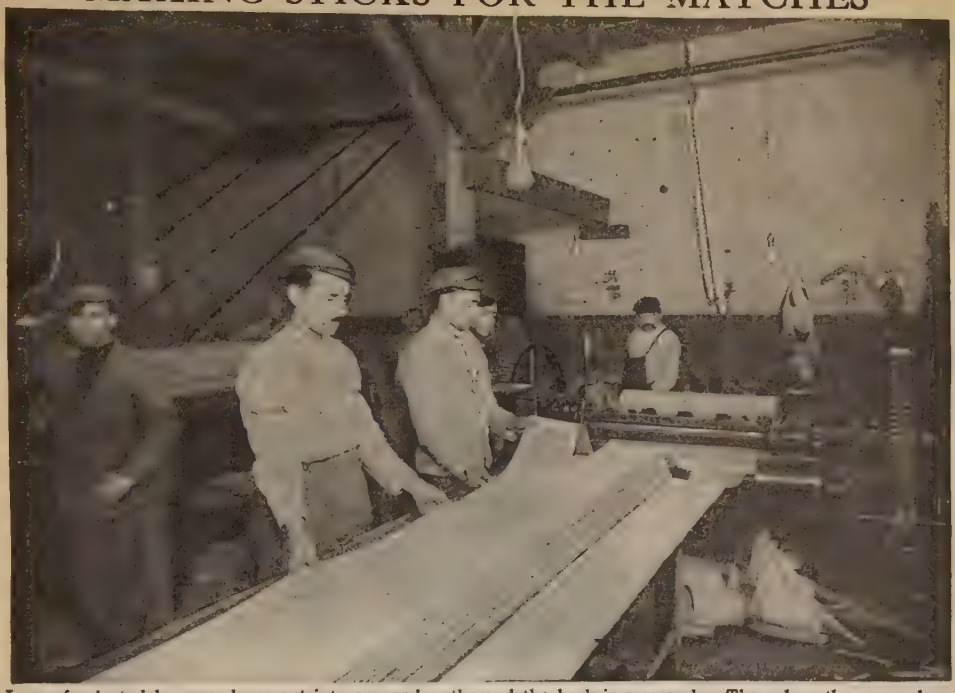
The body or stick of a match is usually a small strip of wood, but sometimes it is a tiny wick of cotton, stiffened with wax. You have seen the beautiful little matches, which the English call vestas. We often see strips of cardboard used in little books of matches which the tobacco shop gives away. The substances in the head of a match are not always the same. Different manufacturers use different mixtures. There is always phosphorus in ordinary matches. Sulphur, nitre, lead, manganese and potash are used by different manufacturers. The double-dip or "bird's-eye" match has a tiny striking tip, but the most of the head is made of some substance which burns easily and gives a good flame. Matches made for use at the seaside, or where the wind blows strongly, have very large heads and burn quite slowly.

How costly fires have been caused by matches

The ordinary matches used years ago did not catch on fire by themselves, but did cause many fires by rubbing together, or by being stepped upon or by being nibbled by rats or mice. Sometimes a whole box in a man's pocket would catch on fire, if he pressed against a wall or the arm of a chair. About 1852, safety matches were made by J. E. Lundstrom, in Sweden. There is no phosphorus in the heads of these matches, but a certain kind of phosphorus is painted on the box. They will strike only on the box, or upon a glassy surface, and therefore are much safer than ordinary matches. Now they are made in many parts of the world, and no other sort of matches should be carried in the pocket, unless one uses a metal match-box.

Years ago workers in match-factories were often attacked by a peculiar disease. The white phosphorus used attacked the

MAKING STICKS FOR THE MATCHES

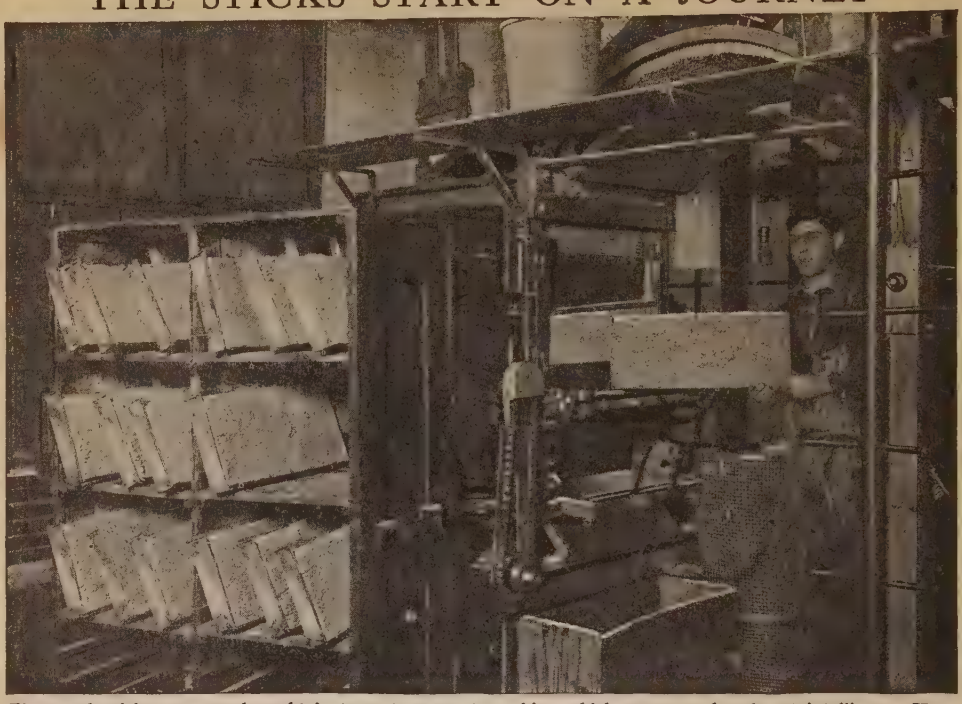


Logs of selected basswood are cut into proper lengths and the bark is removed. These logs then are placed in these machines, which peel off sheets just the thickness of a match. As it leaves the machine each sheet is cut into strips. The men inspect the strips and tear out the parts which contain knots or imperfect places. Machines like these are also used in making veneering to cover up cheaper wood in furniture.

The sheets of veneer then go to these machines, which cut them into the proper length for a match, and split them into the sticks you see here. The trays fill very rapidly, as the sticks tumble out. They are next dried in a kiln, and then go to a machine not shown, which arranges them so that they lie side by side.

All pictures of matches copyright by Brown Bros.

THE STICKS START ON A JOURNEY



The match-sticks are now brought in trays to a great machine which seems to be almost intelligent. Here each stick is shaken and pushed into a tiny hole in the cross-bar of an endless belt. They are now ready to start on their journey through this machine, from which they are to come out perfect matches. Few workmen are needed to manage the machine, which moves at a steady rate. Trays of sticks are ready.

The moving belts, as they glide over the wheels, resemble nothing so much as great scrubbing-brushes. Here you see a man pouring composition of some sort into a tank. The roller in the tank revolves and touches each stick as it passes. The end of each stick must be dipped into other mixtures before it comes out a perfect match. The machine holds two million match-sticks at one time.

MAKING TWO MILLION MATCHES

This great machine twelve feet high and eighty-eight feet long can make twenty-four million matches in a single day. The sticks are first wet with a substance to prevent them from glowing after they are blown out and then in paraffin to make them burn easily. Next they take up a little of the substance which makes the head flame, and then the tiny tip which strikes fire when rubbed. Currents of air dry the tips.

THE PERFECT MATCHES COME OUT

Here we see the completed matches being removed from the machine. After being dipped in the various mixtures, currents of warm air have been blown upon them, and they are now perfectly dry, and ready to go to the packing-room to be placed in boxes. A perfect match can be turned out in fifty-five minutes after the log has been placed in the veneering machine, and the knives begin to peel off the sheets of veneer.

At the left you see a roll of cardboard which is fed into this machine, which prints any words desired upon it, cuts it into proper lengths, bends the piece into shape, glues it together and paints some sand and glue on the side. The result is the outer part of a match-box ready for use. This machine can turn out five hundred boxes every minute. The box which slides into the cover is made in another way.

teeth and the bones of the jaw, and caused great suffering. Now the use of white phosphorus is not allowed, but a harmless red phosphorus is used instead.

WHAT YOU MAY SEE IN A MATCH FACTORY

The pictures will show how matches are made. Logs of wood are cut into a convenient length, and set into a machine which peels off a continuous ribbon of wood exactly the thickness of a match. Another machine cuts these ribbons into the proper length and chops them up into match-sticks, which are then dried. They are then arranged evenly and

Machinery cannot do quite everything. Ordinary matches must be packed by hand, or a bad fire might result. The nimble fingers of the girls gather up the right number of matches, place them in one part of a box, and slip on the outer part which you saw being made. Safety matches can be packed by a machine.

placed in the dipping machine, which looks like a whole series of great revolving scrubbing brushes arranged on a long belt, as you see in the pictures.

You know that a piece of wood sometimes glows for some time after the flame has gone. If match-sticks did this after they were tossed aside many fires might result. The sticks are therefore dipped into alum-water, or some such thing. This dipping does not keep the stick from burning, but it does prevent it from showing a red coal after it has been blown out. The sticks, or splints, as they pass along, are dipped into melted paraffin, which is the same substance of which many candles are made. This makes the splints catch on fire easily when the head blazes.

HOW THE HEAD OF A MATCH IS FORMED

The splints are now ready for the heads. The belt moves the great brushes along, and the ends of the splints dip into tanks which hold the mixtures used by the particular manufacturer. The sticks stand apart, and each splint takes up a little drop of the mixture and forms a little head for each one. You may have seen two matches in a box stuck together. This happens when one of the sticks leans against another. In making some matches, the head is dipped twice. The machine is so long that the heads have time to harden before they are taken out of the machine and carried to the packers. Matches which strike anywhere must be packed by hand, for a machine might press the heads too roughly and cause a fire of thousands of matches.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 2525.

HENRY CLAY ADDRESSES THE SENATE OF THE UNITED STATES

This famous engraving represents Henry Clay addressing the United States Senate on the Compromise of 1850, which he hoped would settle forever the dispute between the North and the South over slavery. Vice-President Fillmore is presiding and Calhoun, at that time a very sick man, stands at his left. Webster, with his head resting on his hand, is seated behind Clay. The other faces are also portraits of the Senators of the time. The Compromise, as we know, did not end the disagreement.

THE CAPITOL BEFORE THE CIVIL WAR

SOME AMERICAN STATESMEN

CONTINUED FROM 2329

IN other parts of our book we have told of many great Americans. Some were statesmen, some were sailors or soldiers, and others showed their greatness in many different occupations or professions. In our stories of the history of the United States we could not tell of all the great men who had a share in building the nation, and in this story we shall say something of a few of the great statesmen.

We might call John Smith the first American statesman. He really understood something about the way that a state must be governed, and he was almost the only man in the Virginia colony who did understand; but he remained in America such a short time that we shall go on to another colonial statesman.

JOHN WINTHROP, FIRST GOVERNOR OF MASSACHUSETTS BAY

The name of John Winthrop is highly honored in New England, as the greatest man in the history of the Massachusetts Bay Colony. He was born in England, in 1588, was educated at Cambridge University and became a lawyer. Though successful in his profession he was not happy in England, for he was a strong Puritan, and did not like the management of religious or state affairs at that time. He determined to move to New England, and was elected governor of the colony which landed in Massachusetts in 1630. Until his death, in 1649, he was governor or deputy governor nearly all the time, and gave his strength of body and mind and will to keep the little colony on the right path. Some of the old Puritans were very stubborn and it was sometimes difficult to prevent them from doing unwise things. Through his influence a sort of union of the New England colonies was formed for defence against the Indians or other foes.

Governor Winthrop was married four times and had many children. One of his sons, also called John, was almost as important in Connecticut as his father was in Massachusetts.

BENJAMIN FRANKLIN, ONE OF THE WISEST MEN OF HIS TIME

The next man of whom we speak belongs partly to colonial days and partly to the United States. This is Benjamin Franklin, who was famous as author, scientist, inventor, business man and statesman. We tell something of his deeds in other volumes. He was born in Boston in 1706, and was the fifteenth child and the tenth son of his mother. His father was a poor candlemaker, but the boy became a printer under his brother. They could not agree, and when seventeen

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years old the boy ran away, and found work in Philadelphia. He spent some time in London, but returned to Philadelphia, opened a shop of his own, bought a newspaper, and became a prominent citizen. Through him the police and the fire departments, a library and an academy were organized. He invented a stove which warmed the rooms with less coal, and performed experiments with electricity, which we described in another place.

He was postmaster of Philadelphia for a time, and later Postmaster General for all the colonies. He formed a plan of union for the colonies, which was not adopted, however, went to England to represent Pennsylvania, and remained there as the representative of all the colonies. He helped to draw up the Declaration of Independence, was sent to France to persuade the French to help the states to gain their liberty, and succeeded in getting money, arms, and men. His simple manners and his wit made him a favorite in Paris. He was at the head of the government of Pennsylvania for three years, and helped to make the Constitution of the United States. He died in 1790 after a busy and useful life. His autobiography is often read in schools as a specimen of good English, and his Poor Richard's Almanac, full of wise sayings, was very popular when published and is still read.

TWO MEN OFTEN MENTIONED TOGETHER

Alexander Hamilton and Thomas Jefferson are often mentioned together in the history of the United States. This is not because they were so much alike, but because they were so different in their ideas and their lifes. We tell you of Jefferson, the Virginian, in another place. Hamilton was born on the island of Nevis in the West Indies in 1757, but came to New York while still a boy and soon entered King's College, now Columbia. He was very much interested in the disagreement between the colonies and Great Britain, and won a great reputation by his writings and speeches, while he was only a boy.

When only nineteen years old, young Hamilton was appointed captain of a company of artillery. He soon attracted the attention of Washington, and became his secretary, but resigned near the end of the war, because he felt that Washington had been unjust to him. At Yorktown he led one of the attacking columns.

After the Revolution, he was a member of Congress for a little while, but soon began to practise law, and was very successful. He saw very clearly the weakness of the government set up under the Articles of Confederation, and urged a stronger government. He was a member of the convention which made the Constitution of the United States, and his writings had much to do with making people agree to accept the new instrument of government.

When the new government began, it had no money and no way to get it. The country owed a great deal at home and abroad, and no one could see how the debts were to be paid. President Washington appointed Hamilton to the new office of Secretary of the Treasury, and he at once set to work to find ways to get money. He was wonderfully successful, and soon the new government had money enough, though some people grumbled at the taxes.

The salaries paid by the new government were small, and Hamilton, who had married the daughter of General Philip Schuyler, and had several children, felt that he must make more money for his family. He resigned his office in 1795, and returned to New York, but continued to take great interest in politics. During the administration of John Adams, he had more influence in the nation than the president himself.

You remember that, in 1800, Jefferson and Aaron Burr got the same number of votes, and so the choice was with the House of Representatives. Hamilton did not like Jefferson, but he felt that he was a better man than Burr, and advised all his friends to vote for Jefferson, though some of them wished to vote for Burr. Jefferson was chosen president and Burr vice-president. Burr felt that he had lost the presidency because of Hamilton, and the latter also opposed his desire to be elected governor of New York. Burr challenged him to a duel in 1804, for in those days men often fought to settle their quarrels. Though Hamilton's son had been killed in a duel only a little while before, he accepted, and a meeting took place, July 11, 1804, at Weehawken, New Jersey, just across the river from New York. Hamilton was mortally wounded and died the next day.

Few men have done more for the United States than this man, though we do not to-day believe in all of his ideas. He did not think that the people could govern themselves, and thought that only men of property and education should vote. He thought that the president and the senators ought to hold office for life, and did not believe in allowing the states to keep much power. He deeply loved his country, and served it with all his strength, and his name will be long remembered.

ANOTHER FOREIGNER WHO HELD HIGH OFFICE

Another great statesman, who was born about the same time, was also a foreigner. This was Albert Gallatin, born in Switzerland in 1761, and also educated there. He came to Boston just as the Revolutionary War was coming to an end, and went into business. He failed, and then taught French in Harvard College for a little while. He did not feel happy in New England, however, and moved to western Pennsylvania, then almost a wilderness. The young Swiss was afraid of a strong government and tried to prevent his state from accepting the Constitution of the United States, but did not succeed.

Though he could not yet speak good English, he was sent to the Pennsylvania legislature, and was even sent to the United States Senate in 1793. There was a dispute about the length of time he had been a citizen, and he was not allowed to remain in the Senate. His state sent him back to the House of Representatives, and there he became the leader of the new Republican party which Jefferson was founding, and when that great man became president, he made Gallatin Secretary of the Treasury.

Gallatin believed that the business of a state should be conducted like that of a family. He thought that a state should pay back all borrowed money as soon as possible, just as a family would do. Therefore he set himself to pay off the debt of the United States, and for twelve years worked to do it. All his plans were broken up by the War of 1812, and he went to Europe in 1813, to try to bring about peace. He did not succeed at first, but he was one of the men who made the Treaty of Ghent, which ended the war.

President Madison gave him the choice of becoming Minister to France, or of taking his old place as head of the Treasury. He chose the former and remained in France seven years. He was talked of for vice-president in 1824, but was not a candidate, and in 1826 was sent to England as Minister. He did not stay long, but came back to New York, and became president of a bank. As he did not have very much work to do, he gave most of his time to the study of the Indian tribes. To the end of his life, in 1849, he was always ready to give his advice and help in all questions of government.

A DISTINGUISHED SON OF A BRILLIANT MOTHER

The next American of whom we shall speak, was born in 1767, in Massachusetts, where his ancestors had lived from the first years of that colony. His father was John Adams, the second president, and his mother was Abigail Smith, of whom we tell in Famous Ladies of the White House. The boy was called John Quincy, in honor of his mother's grandfather, and soon showed that he had a remarkable mind. His father was sent to England by Congress in 1778, and the boy went along, but kept up his studies in Paris and Leyden. In 1781, when only fourteen years old, he was appointed private secretary to the Minister to Russia, but soon returned to Paris and acted as one of the secretaries of the men who were making a treaty of peace between the United States and Great Britain. When that task was completed he returned home and entered Harvard College.

After his graduation from Harvard, in 1787, at the age of twenty, he studied law, but Washington sent him as Minister to the Netherlands in 1794, and later he was transferred to Prussia. On his return to the United States he became United States Senator from Massachusetts in 1803. The next office was that of Minister to Russia, and then he was one of the men who made the treaty of peace with Great Britain after the War of 1812.

It seemed that the country could not get along without him, and he was sent to London as United States Minister, but was recalled to become Secretary of State under President Monroe. He had had all these honors before he was fifty years old. In the State Department he served eight years, and won great fame.

He managed the purchase of Florida

from Spain, the discussion of the fisheries disputes with England, and the argument about the Oregon question. The most important thing he did was to write a few paragraphs in one of President Monroe's messages which we now know as the "Monroe Doctrine." You are told what this means in another part of our book.

In 1824, he was elected President of the United States, but many things prevented him from being a success. In the election no candidate got a majority of the votes, and General Andrew Jackson received more than Adams. The House of Representatives chose Adams, and all of Jackson's friends were angry. Then, too, President Adams liked to have his own way and did not get along with Congress, which refused to do the things he advised. He was again a candidate in 1828, but was badly beaten, and went out of office in 1829.

How President Adams spent his last years

Mr. Adams was now sixty-two years of age; he had lived a very busy life, and had held the highest offices his country could give. Many men would have been glad to retire, and live a life of ease. Mr. Adams did not think of such a thing. Though he had been United States Senator, Secretary of State and President, he took a seat in the House of Representatives in 1831, and was re-elected term after term until his death.

He spoke on every question that interested him, and spoke so well that he was called "The Old Man Eloquent." His chief work was directed against slavery, and he always said what he really thought. In 1848, he had a paralytic stroke on the floor of the House and died two days later at the age of eighty-one. No man in all our history served his country more faithfully.

Three men usually mentioned together

Now we come to three men who are often spoken of together, because they were in public life at the same time, and had great influence in the nation. All of them served in both houses of Congress, all held Cabinet offices, two were candidates for president, and one was twice elected vice-president. These men were Henry Clay, of Kentucky; John C. Calhoun, of South Carolina; and Daniel Webster, of Massachusetts.

Henry Clay was the oldest and came first into notice. He was born in Virginia, in 1777, during the Revolution, and went to work as a clerk in Richmond, at the age of fourteen. As he was very intelligent and wrote a good hand, a distinguished judge employed him as a sort of secretary. After studying law a little while, he was given permission to practise when only twenty years of age, and moved to the new state of Kentucky. His power of making friends was very great, and he was soon successful both in law and in politics.

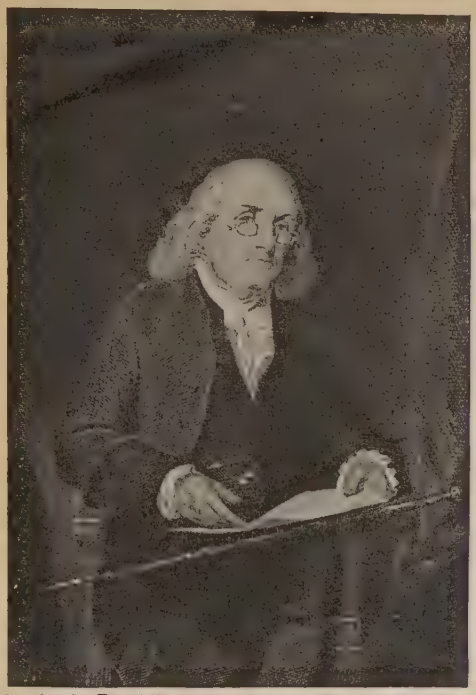
Before he was really old enough, he was appointed to fill a vacancy in the United States Senate. This time he served only a few months, but was again appointed for a short time in 1809. He now determined to go into politics in earnest. In 1811, he became a member of the House of Representatives, and was at once elected Speaker. In another place we have told of the trouble with Great Britain about American ships and sailors. Jefferson and Madison had tried to avoid war, but Clay, Calhoun and other young men favored war so strongly, that they were called "The War Hawks." After the war he was a member of the commission which arranged a treaty of peace.

Clay arranges the Missouri compromise

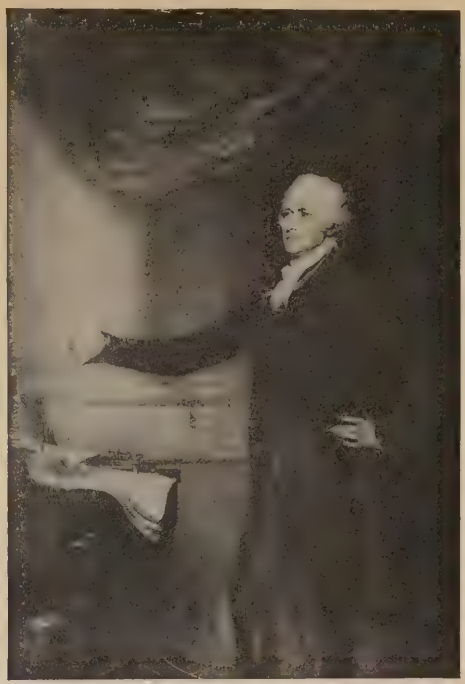
While a member of the House he arranged the Missouri Compromise, about which you can read in the History of the United States, and in 1824 was a candidate for president, but was defeated. During John Quincy Adams' administration he served as Secretary of State, but in 1831 again became a member of the United States Senate, where he gained his greatest fame. He was again a candidate for president in 1832, but was defeated by Andrew Jackson. He resigned in 1842, but was the Whig candidate for president in 1844, against James K. Polk. He was again elected to the Senate in 1848, and served until his death in 1852.

During his long service Clay was noted for two things. He was a strong advocate of a tariff to keep out foreign goods, so that all the articles we needed might be manufactured in the United States. This policy he called the "American System." He is even more noted for his efforts to settle differences of opinion which threatened to break up the Union.

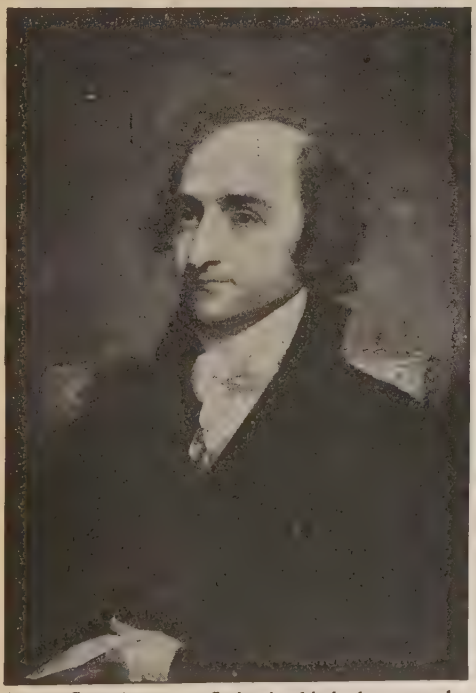
STATESMEN OF THE EARLY DAYS



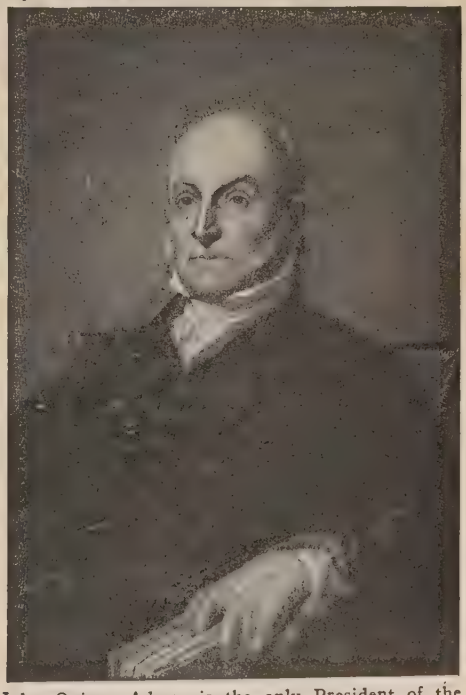
Benjamin Franklin was statesman, diplomat, author, inventor, and with it all a shrewd and able business man. He signed both the Declaration of Independence and the Constitution of the United States.



Alexander Hamilton was born in the West Indies, but came to the United States when only a boy. He won his greatest fame as Secretary of the Treasury. He was killed in a duel with Aaron Burr.



Albert Gallatin was a Swiss by birth, but soon became a good American. He was Secretary of the Treasury under President Jefferson and made a great record. Later in life he was a banker.



John Quincy Adams is the only President of the United States whose father had held the office before him. He held other high places in the government, and died while a member of Congress.

In 1821, in 1833, and again in 1850, he came forward with plans which both sides accepted, and gained the title of the "Great Pacificator."

No man in our history has been so much loved as Clay, but he failed to gain the presidency, which he desired above all things. Though a candidate three times, there was always some special reason for his defeat. Once, when told that some act of his would lose the presidency, he said, "I would rather be right than president." This is a noble sentiment which every one of our readers should remember.

JOHN C. CALHOUN, VICE-PRESIDENT AND SENATOR

Though John C. Calhoun had a greater mind than Clay, he did not have such power to gain the affections of men. He was born in South Carolina in 1782, and when twenty years of age entered the junior class of Yale College, and was graduated with high honors two years later. After studying law in Connecticut, and in South Carolina, he began to practise, but was soon sent to the legislature of South Carolina, and then to the United States House of Representatives, where he favored a declaration of war against Great Britain. In 1817, he became Secretary of War under President Monroe, and made a fine record. He was elected to the vice-presidency in 1825, under John Quincy Adams, and was re-elected. He quarreled with President Jackson, however, and resigned in 1832, before the end of his term.

We have already told in another place of the objection of South Carolina to the high tariff laws of 1828 and 1832. Though Calhoun had favored a protective tariff in 1816, he had come to believe that such laws were unconstitutional, and that they would ruin the South. He declared that a state had the right to decide whether a law was wrong, and could refuse to obey it. This is called "Nullification." As soon as he resigned the vice-presidency he was sent to the United States Senate, and there spoke for what he thought were the interests of the South. For nearly a year, in 1844 and 1845, he was Secretary of State under President Tyler, and helped to bring Texas into the Union.

As soon as he left this office, he was again sent to the United States Senate, and remained there until his death, though his health and strength were failing fast. He died in 1850, while the question of admitting California to the Union was before the Senate.

This statesman saw earlier than most of the men of his day that the Union could not continue part slave and part free unless the states had more power than the national government. If Congress tried to make laws upon the question of slavery, there was sure to be trouble. Calhoun loved the South, and, in 1849, spoke of "dissolving the partnership," that is, breaking up the Union, as necessary if the rights of the South were trampled upon. He loved the Union, but he loved the South more.

DANIEL WEBSTER, THE EXPOUNDER OF THE CONSTITUTION

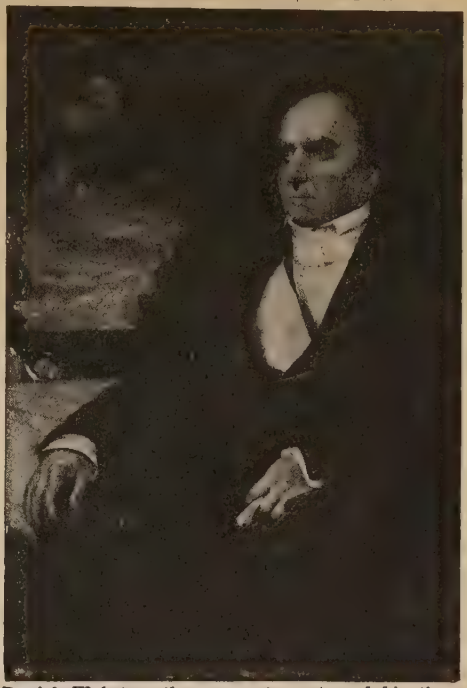
We have said that Clay was a great orator and Calhoun a great thinker. Now we come to a man who was both an orator and a thinker. Daniel Webster was born on a small farm in New Hampshire, in 1782, the same year that his great opponent, John C. Calhoun, was born in South Carolina. He was a delicate child, and so eager to learn that his father, a soldier of the Revolution, determined to send him to college. In 1797, he entered Dartmouth College, then a small, struggling institution, and was graduated four years later.

Like so many young men of the time, he taught school, but also studied law, and in 1805, began to practise in a little village near his home. Soon he removed to Portsmouth, then a flourishing town, and, in 1812, was elected to the United States House of Representatives, and was re-elected. During his second term he decided to move to Boston, where there were greater opportunities for a lawyer. While in Congress he opposed the War of 1812, as the people of New England felt that it was harmful to that section. Soon after he removed to Boston, the people began to speak of sending him to Congress from Massachusetts; in 1822, he was again elected to the House of Representatives, and remained until he was elected to the Senate in 1827. From that time until his death he was a member of the Senate, or else Secretary of State nearly all the time.

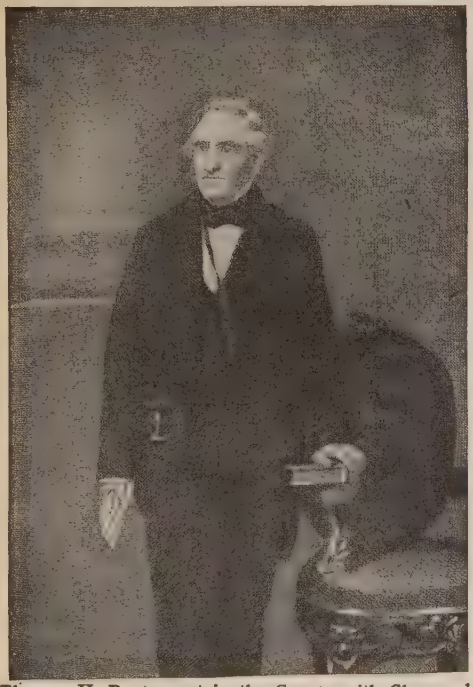
While telling you of Calhoun, we spoke of the dissatisfaction of South Carolina at the tariff laws. One of the Senators for South Carolina, Robert Y. Hayne,

STATESMEN OF THE MIDDLE PERIOD

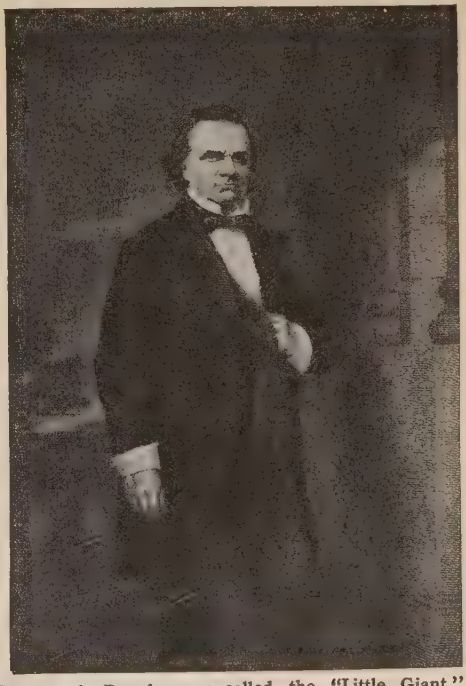
Henry Clay was one of the best loved and most influential men ever in public life in the United States, but he failed to realize his ambition to be president. He was the great peacemaker while in Congress.



Daniel Webster, the greatest orator of his time, though born in New Hampshire, moved to Massachusetts and represented that state in the Senate for many years. He served twice as Secretary of State.



Thomas H. Benton sat in the Senate with Clay and Webster, but opposed them in politics. He was a member of the Senate for thirty years, and wrote a large book telling what he had seen there.



Stephen A. Douglas was called the "Little Giant." He introduced the Kansas-Nebraska Bill, and was defeated for the presidency by Abraham Lincoln. He was only five feet tall, but seemed much taller.

made a speech in which he said that New England had always been unfair to the South and the West, and that the Union might be broken up if those sections were not better treated. He also said that the Union was simply an agreement between the states, and that any state had a right to leave the Union or to refuse to obey unjust laws.

Senator Webster replied in a speech four hours long, in which he defended New England, and declared that the Union could not be dissolved. His speech closed with the words: "Liberty and Union, now and forever, one and inseparable." This famous speech, called "The Reply to Hayne," is known to every schoolboy.

In 1841, Mr. Webster became Secretary of State under President Harrison, and continued in office for a time under President Tyler. The most important thing he did was to make a treaty with Great Britain which settled the boundary between Maine and Canada. After the treaty had been signed, Mr. Webster resigned and went back to the law. He had bought a farm in Marshfield, near Boston, and loved to spend much time there.

He always spent a great deal of money, and while in Washington, had gone into debt. He wished to practise law, for which he could get large fees, so that he would not be troubled about money, but the people of Massachusetts again sent him to the Senate in 1845. He accepted, as he hoped to be elected President of the United States, but in this he failed, as Clay had also done.

His last great speech was made in 1850, when he favored the Compromise of 1850. Some of the New England people were opposed to making any compromise with slavery, and Mr. Webster was much abused for his "Seventh of March Speech." While he was not a friend to slavery, he loved the Union and wished to preserve it at any cost. Before the Compromise had passed, President Fillmore offered him the position of Secretary of State, and for a second time he took that great office. He was already a sick man, and it was well that no great question came up while he was in office. In 1852, the Whig party nominated General Scott for president. A party always wishes to win, and always nominates the man whom the leaders think can get the most votes. Mr. Webster had made enemies during his long service, and the leaders thought that a military hero might get more votes. This is the reason why many of our greatest men have never been chosen to head the nation.

Mr. Webster was much disappointed, and only a few days before the election he died at his beloved Marshfield. He had had a wonderful life. From a poor New Hampshire farm he had gone on to high position in the nation. He was looked upon as the greatest lawyer and orator of his time. He had gained everything except that which he most desired.

A MAN WHO WAS SENATOR FOR THIRTY YEARS

Another statesman, who was in the Senate with Webster, Clay and Calhoun, and had great influence there, was Thomas Hart Benton. He was born in North Carolina in 1782, and attended the State University for a little while. His father died early, and his mother moved to Tennessee, where the young man studied law, and was soon elected to the legislature. He volunteered during the War of 1812, but saw no fighting.

Missouri was then growing rapidly and the ambitious young lawyer moved to St. Louis in 1815. He edited a paper, had many quarrels and fought several duels, but made many friends. When Missouri was admitted as a state according to the Missouri Compromise, he was chosen one of the first Senators and served five terms, thirty years. Few men have served so long as this.

In the Senate he took a prominent place, though the measures he favored did not always become laws. For example he wished to have the President of the United States elected directly by the people, and he was much opposed to paper money. He believed that only metal should be used as money, and was often called "Old Bullion" for this reason. He favored building a railway to the Pacific, and he also favored giving farms to the people instead of selling public lands. Both of these things were done after he had left the Senate. When many men did not think the United States should gain more territory, Senator Benton believed in going to the Pacific.

Though he had quarreled with Andrew Jackson before he left Tennessee, they

became friends again. While Jackson was president, Senator Benton was one of his strongest supporters. In some things they were much alike. Both were Western men, and though both held slaves, they hated men who were willing to break up the Union on account of slavery. Because he grew to believe that slavery should not be extended into some of the new western lands, he was finally defeated, and retired in 1851.

He had held office so long that he could not be happy as a private citizen. He was elected to the House of Representatives in 1852, but because of his views on slavery served only one term. Then he was a candidate for governor of Missouri in 1856, but he had lost his popularity and his defeat broke his heart.

STEPHEN ARNOLD DOUGLAS, "THE LITTLE GIANT"

Another Western man was younger than any of these, but was almost as important. This was Stephen Arnold Douglas, who was born in Vermont in 1813. His father died soon after the birth of the boy, and at the age of fourteen he was apprenticed to a cabinet-maker. He was determined to do something else, and soon began the study of law. The West seemed to offer a better chance, and he moved to Illinois in 1833, and began to practice law. He made many friends and held several small offices. When only twenty-eight years old he became judge of the Supreme Court of the State.

He found his place when he became a member of the United States House of Representatives in 1843. In spite of his youth he at once became prominent. He, like Benton, believed that the United States should extend its territory, but, unlike him, was willing to go to war with Great Britain over the Oregon country. He also favored a railroad to the Pacific.

From 1847 until his death he was a member of the Senate, where he was known as the "Little Giant," for he was only five feet tall. In the Senate he spoke on many questions, but the measure for which he is chiefly remembered was the Kansas-Nebraska Bill, about which you may read in another place. He believed that the people of a territory ought to decide important questions like slavery for themselves.

Though Senator Douglas owned no slaves himself, his wife, a North Carolina woman, owned some, and the new Republican party, which was growing in Illinois, wished to defeat him for the senate. Abraham Lincoln was put up as the candidate against him, as you may read in our story of Lincoln in another place, but Douglas was re-elected.

In 1860 he was nominated for the presidency, by the Northern Democrats, but the Southern Democrats nominated another man, and for this reason Lincoln was elected. Douglas loved the Union, and opposed the efforts of the Southerners to break it up. He did everything he could to help President Lincoln, but died in 1861, before war really began.

WILLIAM H. SEWARD, A FOUNDER OF THE REPUBLICAN PARTY

We have told you much of Abraham Lincoln in other parts of our book, and now shall speak of one of his helpers. This was William H. Seward, who was born in Orange County, New York, in 1801. He was graduated from Union College in 1820, studied law, and began to practise in 1822. Soon he was elected to the legislature, and became governor of New York at the early age of thirty-seven. He was elected to the United States Senate as a Whig in 1849, and re-elected in 1855, but his dislike of slavery finally led him to help to organize the new Republican party.

Most people expected him to be the Republican candidate for president in 1860, but Abraham Lincoln was chosen instead. President Lincoln at once made Mr. Seward Secretary of State, and in this office he served until 1869. He was always loyal to his chiefs, and managed the foreign affairs of the country with much skill. Besides much difficult business with Great Britain, he got the French out of Mexico and purchased Alaska from Russia. When Lincoln was assassinated, an attempt was made to kill him as he lay sick in bed. After leaving office, he made a trip to Alaska and then went around the world. He died in 1872.

These are a few of the men of the past who deserve to be held in honor by young Americans. There are many more, besides the men of recent times. We can not find space to tell you of all the men who have held high positions during the past fifty years, even if we were sure which of them are really great.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 2487.

FRANKLIN AT THE FRENCH COURT

When Benjamin Franklin was the minister of the thirteen states at the French court, his simple manners, quaint speech, and ready wit made him a favorite with the frivolous and the wise alike. Here he is being crowned with a laurel wreath. He did not object to anything by which he might make a friend for America. He succeeded in getting arms, money, and men, without which the Revolution could not have been won.

Alexander Hamilton built for himself a country house outside of New York, which he called Hamilton Grange, after the residence of the family in Scotland. Though it has been twice moved it now stands within sight of the original location. The city has long since reached the house and now goes on far beyond it, but it was miles out in the country then. At present it is at 141st Street and Convent Avenue.

THE FRIEND OF COLUMBUS

CONTINUED FROM 2348

QUEEN ISABELLA OF CASTILE was not only one of the ablest of queens, but one of the most generous of women.

Peter Martyr, a man who lived in her palace and knew her well, wrote to the Archbishop of Granada on the day of her death: "My hand falls powerless by my side from very sorrow. The world has lost its noblest ornament. She was the mirror of every virtue, the shield of the innocent, and an avenging sword to the wicked."

Isabella was Queen of Castile in her own right, and by her marriage with Ferdinand, King of Aragon, the two kingdoms were united, and have ever since remained parts of Spain.

For one thing the whole world will ever be grateful to Isabella of Castile. In pity for the sufferings of the wounded, she paid surgeons to go with the army and care for the soldiers hurt on the field of battle. Six roomy tents, called "The Queen's Hospital," were supplied with beds and all appliances that the rough surgery of those days had in use. Thus it is to the kind heart of this good woman that we owe the first camp hospital for use in war.

Many stories are told of the queen's generosity, piety, humility, and wise plans for the good of the people over whom she ruled. She once saw a bull-fight, and though she could not make the people give up the brutal national amusement, she refused to be present at another unless the sharp horns of the bulls were guarded to prevent injury to the beasts.

Perhaps Queen Isabella's name is best known to American boys and girls as the friend and helper of Columbus. She and her husband believed at first that Columbus was merely a needy adventurer and sent him away. The statesman Santangel, however, came to his help, and then the queen was won over. She no longer hesitated, but entered warmly into the question of ways and means, declaring she would undertake the matter for her own country of Castile, and that she would even pawn her jewels to pay the expenses of the expedition. Santangel was much pleased at the queen's offer, but said it was not necessary for her to pawn her jewels.

Columbus was at once brought back into the royal presence. On April 17, 1492, Ferdinand and Isabella made an agreement with him to undertake the voyage westward.

The story of the wonderful venture and what Columbus found is told elsewhere. It was like the good queen to refuse to allow the people in America to be brought to Spain as slaves, and she made some captains who brought over cargoes of them take them back to their own homes.

THE GIRL WHO SAW THE TSAR

ABOUT a hundred years ago a Russian officer offended the Tsar, and was banished with a number of other exiles to a cold and dreary place in the north of Siberia. The prisoners went through all manner of hardships, but this Russian officer was allowed to take with him his wife and little daughter, Prascovia; so that he was saved the agony of separation from them.

Life to the exile in Siberia was a rough and hard one, and as the years went by, and hope of pardon grew less and less, it was sad for the parents to watch their little daughter growing a big, untaught girl in such rough surroundings. Seeing her father so unhappy, Prascovia was unhappy, too; and then one day, when she was nearly fifteen years old, the idea flashed into her mind that she ought to go to Petrograd and beg the Tsar to pardon her father.

Could she do it? To walk all those dreary hundreds and hundreds of miles to Russia! Would her father and mother consent to let her try? Anxiously, with beating heart, she told her father what it was in her mind to do. But he only smiled at the idea of his young daughter venturing on such a mad errand.

THE LONG JOURNEY WHICH BEGAN AFTER A LONG, LONG WAITING

Three years went by, and little Prascovia was growing helpful and womanly. She had never forgotten her cherished plan, and she put it before her father again. This time her father and mother listened to her, but begged her not to think of leaving them for such a dangerous venture. But Prascovia got another exile to write a request for a passport, and in six months that passport reached her.

Now that the way was open, Prascovia's father tried to dissuade her from starting. How could she, a penniless, unknown girl, gain access to the Tsar, even if she braved the dangers of the journey? But Prascovia put her trust in God, knelt to receive her parents' blessing, kissed them, and, with just one ruble in her pocket, started on her long walk through the forest. Her parents went with her a little way to the town near, where she had friends who gave her a bed the first night; but next day her lonely tramp began. On and on, through the miles of forests, over rough roads and across rivers, Prascovia plodded, sometimes losing her way, sometimes getting soaked with rain, often weak with hunger and spent with exhaustion. At times she met with kindness, was made welcome at a cottage, or got a lift in a cart; at other times she was roughly ordered away or hooted by village boys.

THE SORROWS OF THE LONG WALK TO PETROGRAD

In one cottage where she spent a night the people seemed so unfriendly and suspicious that Prascovia was afraid they meant her ill, especially when, thinking her asleep, they searched her clothing. But they were merely curious.

As winter came on and snow fell, Prascovia's misery increased, and she was often hindered by the snow-drifts. When in a barge on the Volga, she was pushed into the water by accident, and as a result fell ill; but some good nuns nursed her till she was well again.

At last Prascovia, much to her joy, reached Petrograd. A kind lady interested herself in the girl, and took care of her, until an opportunity came to present her petition to the mother of the Tsar. This lady was touched with the story Prascovia told her, and promised to take her to the Tsar.

Now the way was clear, and two days later Prascovia was in the presence of the Tsar. To her relief, he received her kindly, promised inquiry into her father's trial, and gave her five thousand rubles. The grateful girl poured forth her thanks and blessings on the Tsar.

THE PARDON FOR WHICH A BRAVE GIRL PAID WITH HER HEALTH

And so Prascovia got the pardon for her father, and when the Tsar asked if there was anything she wanted for herself, she begged for a like act of mercy for two friends of her father who were also in exile.

Prascovia soon set out to meet her parents on their way home from Siberia, and joyful indeed was the meeting; but the poor girl never really recovered from the hardships of her long journey, and she was an invalid during the rest of her life.

THE NEXT GOLDEN DEEDS BEGIN ON PAGE 2507.

A MERRY OLD ENGLISH BALLAD

A NUMBER of old English ballads have already appeared in our pages, and the following is a further example of these very old and once extremely popular stories in rhyme. Its proper title is "King John and the Abbot of Canterbury," but the tale which it tells is, of course, to be regarded entirely as fiction, as there are endless stories of a somewhat similar kind, in which three questions have to be answered, the last of the three seeming to be unanswerable. The way in which it is always possible to answer them serves to illustrate the resources of human ingenuity. The spelling of the words in this ballad has been modernized.

THE KING AND THE ABBOT

CONTINUED FROM 2309

AN ancient story I'll tell you anon
Of a notable prince, that was called King John;
And he ruled England with main and with might,
For he did great wrong and maintain'd little right.

And I'll tell you a story so merry,
Concerning the Abbot of Canterbury;
How for his housekeeping and high renown.
They rode post for him to fair London town.

An hundred men, the King did hear say,
The Abbot kept in his house every day;
And fifty gold chains, without any doubt,
In velvet coats waited the Abbot about.

"How now, Father Abbot, I hear it of thee
Thou keepest a far better house than me;
And for thy housekeeping and high renown,
I fear thou work'st treason against my crown."

"My liege," quo' the Abbot, "I would it were known
I never spend nothing, but what is my own;
And I trust your Grace will do me no deer
For spending of my own true-gotten gear."

"Yes, yes, Father Abbot, thy fault it is high,
And now for the same thou needest must die;
For except thou canst answer me questions three,
Thy head shall be smitten from thy body.

"And first," quo' the King, "when I'm in this stead,
With my crown of gold so fair on my head,
Among all my liegemen so noble of birth,
Thou must tell me to one penny what I am worth.

"Secondly tell me, without any doubt,
How soon I may ride the whole world about.
And at the third question thou must not shrink,
But tell me here truly what I do think."

"Oh, these are hard questions for my shallow wit,
Nor I cannot answer your Grace as yet;
But if you will give me but three weeks' space,
I'll do my endeavour to answer your Grace."

"Now three weeks' space to thee I will give,
And that is the longest time thou hast to live;
For if thou dost not answer my questions three,
Thy lands and thy living are forfeit to me."

Away rode the Abbot all sad at that word,
And he rode to Cambridge, and Oxenford;
But never a doctor there was so wise,
That could with his learning an answer devise.

Then home rode the Abbot of comfort so cold,
And he met his shepherd a-going to fold:
"How now, my lord Abbot, you are welcome home;
What news do you bring us from good King John?"

"Sad news, sad news, shepherd, I must give,
That I have but three days more to live;
For if I do not answer him questions three,
My head will be smitten from my body.

"The first is to tell him there in that stead,
With his crown of gold so fair on his head,
Among all his liegemen so noble of birth,
To within one penny of what he is worth.

"The second, to tell him, without any doubt,
How soon he may ride this whole world about;
And at the third question I must not shrink,
But tell him there truly what he does think."

"Now cheer up, Sir Abbot, did you never hear yet
That a fool he may learn a wise man wit?
Lend me horses, and serving men, and your apparel,
And I'll ride to London to answer your quarrel.

"Nay, frown not, if it hath been told unto me,
I am like your Lordship, as ever may be;
And if you will but lend me your gown,
There is none shall know us at fair London town."

"Now horses and serving men thou shalt have,
With sumptuous array most gallant and brave;
With crozier, and mitre, and rochet, and cope,
Fit to appear 'fore our father the Pope."

"Now welcome, Sir Abbot," the King he did say,
"'Tis well thou'rt come back to keep thy day:
For and if thou canst answer my questions three,
Thy life and thy living both saved shall be.

"And first, when thou see'st me here in this stead
With my crown of gold so fair on my head,
Among all my liegemen so noble of birth,
Tell me to one penny what I am worth."

"For thirty pence our Saviour was sold
Among the false Jews, as I have been told:
And twenty-nine is the worth of thee,
For I think thou art one penny worse than He."

The King he laughed, and swore by St. Rittel,
"I did not think I had been worth so little!
Now secondly, tell me, without any doubt,
How soon I may ride this whole world about."

"You must rise with the sun, and ride with the same,
Until the next morning he riseth again;
And then your Grace need not make any doubt,
But in twenty-four hours you'll ride it about."

The King he laughed, and swore by St. Jone,
"I did not think it could be done so soon!
Now, from the third question you must not shrink,
But tell me here truly what I do think."

"Yea, that shall I do, and make your Grace merry:
You think I'm the Abbot of Canterbury;
But I'm his poor shepherd, as plain you may see,
That am come to beg pardon for him and for me."

The King he laughed, and swore by the Mass,
"I'll make thee Lord Abbot this day in his place!"
"Now, nay, my liege, be not in such speed
For alack, I can neither write nor read."

"Four nobles a week, then, I will give thee,
For this merry jest thou hast shown unto me;
And tell the old Abbot, when thou comest home,
Thou hast brought him a pardon from good King John."

HOME-THOUGHTS FROM ABROAD

Few verses of Robert Browning's are more often quoted than the first eight lines of the following little poem, which is instinct with the pathos of the Englishman who is away in foreign lands and dreams of the loveliness of his own homeland when the sweet days of springtime have come again.

OH, to be in England
Now that April's there,
And whoever wakes in England
Sees, some morning, unaware, [sheaf
That the lowest boughs and the brushwood
Round the elm-tree bole are in tiny leaf,
While the chaffinch sings on the orchard bough
In England—now!

And after April, when May follows,
And the white-throat builds, and all the swallows! [hedge
Hark, where my blossomed pear-tree in the
Leans to the field and scatters on the clover
Blossoms and dewdrops—at the bent spray's edge—
That's the wise thrush; he swings each song twice over, [capture
Lest you should think he never could re-
The first fine careless rapture! [dew,
And though the fields look rough with hoary
All will be gay when noontide wakes anew
The buttercups, the little children's dower,
Far brighter than this gaudy melon-flower!

O CAPTAIN! MY CAPTAIN!

This poem, composed by Walt Whitman, is one of the finest tributes ever paid to the great President, Abraham Lincoln, who was shot by Wilkes Booth.

O CAPTAIN! my Captain! our fearful trip is done,
The ship has weathered every rack, the prize we sought is won; [exulting,
The port is near, the bells I hear, the people all
While follow eyes the steady keel, the vessel grim and daring;
But, O heart! heart! heart!
O the bleeding drops of red,
Where on the deck my Captain lies,
Fallen cold and dead.

O Captain! my Captain! rise up and hear the bells;
Rise up—for you the flag is flung—for you the bugle trills,
For you bouquets and ribboned wreaths—for you the shores a-crowding,
For you they call, the swaying mass, their eager faces turning;
Here Captain! dear father!
This arm beneath your head!
It is some dream that on the deck
You've fallen cold and dead.

My Captain does not answer, his lips are pale and still,
My father does not feel my arm, he has no pulse nor will,
The ship is anchored safe and sound, its voyage closed and done,
From fearful trip the victor ship comes in with object won;
Exult, O shores, and ring, O bells!
But I, with mournful tread,
Walk the deck my Captain lies,
Fallen cold and dead.

THE IRISH HARPER

Thomas Campbell has in these favorite verses given us a pathetic and beautiful picture of the faithful friendship of a dog for his poor but kind master. It is no wonder that poets delight to praise the dog, whose friendship for its master is never affected by the worldly position of the latter.

ON the green banks of Shannon, when Sheelah was nigh,
No blithe Irish lad was so happy as I;
No harp like my own could so cheerily play,
And wherever I went was my poor dog Tray.

When at last I was forced from my Sheelah to part,
She said—while the sorrow was big at her heart:
"Oh! remember your Sheelah, when far, far away,
And be kind, my dear Pat, to our poor dog Tray."

Poor dog! he was faithful, and kind, to be sure
And he constantly loved me, although I was poor;
When the sour-looking folks sent me heartless away
I had always a friend in my poor dog Tray.

When the road was so dark, and the night was so cold,
And Pat and his dog were grown weary and old,
How snugly we slept in my old coat of grey,
And he licked me for kindness—my poor dog Tray.

Though my wallet was scant, I remembered his case,
Nor refused my last crust to his pitiful face;
But he died at my feet one cold winter's day,
And I played a lament for my poor dog Tray.

Where now shall I go, poor, forsaken, and blind?
Can I find one to guide me, so faithful and kind?
To my sweet native village, so far, far away,
I can never return with my poor dog Tray.

THE STREAM AND THE OCEAN

Victor Hugo was one of the great poets and novelists of France. Most of his stories have been translated into English but not all his poems. These short verses have not the grand roll and the passion of his great poems, as those would not suit the subject he has here chosen; but they make a charming little poem, which has been specially translated into English for our book by Mr. Harold Begbie.

THE streamlet down from the mountainous glen
Fell drop by drop to the roaring sea;
And the ocean, strewn with the wrecks of men,
Cried. "Whimperer, what dost thou want with me?"

"Lo, I am the terror that none may fence,
I drive to the edge of the sky my way;
And can I, who am terrible, strong, immense,
Have need of thy trickles of dew and spray?

Then the streamlet answered the ocean back:
"O bitter sea, to your furious brink,
Without glory or noise, I give what you lack—
A drop of water that men can drink."

THE IVY GREEN

Charles Dickens we all know as one of the greatest English novelists, but hardly at all as a poet. He was not a poet of any note, however, and wrote very little verse. The poem that follows is at least of interest as it was written by him, whose name is so famous and so deservedly revered.

OH, a dainty plant is the ivy green,
That creepeth o'er ruins old!
Of right choice food are his meals, I ween,
In his cell so lone and cold.
The wall must be crumbled, the stone decayed,
To pleasure his dainty whim;
And the mouldering dust that years have made
Is a merry meal for him.
Creeping where no life is seen,
A rare old plant is the ivy green.

Fast he stealeth on, though he wears no wings,
And a staunch old heart has he.
How closely he twineth, how tight he clings,
To his friend, the huge oak-tree!
And slily he traileth along the ground,
And his leaves he gently waves,
As he joyously hugs and crawleth round
The rich mould of dead men's graves.
Creeping where grim death has been,
A rare old plant is the ivy green.

Whole ages have fled, and their works decayed,
And nations have scattered been;
But the stout old ivy shall never fade
From its hale and hearty green.
The brave old plant in its lonely days
Shall fatten upon the past;
For the stateliest building man can raise
Is the ivy's food at last.
Creeping on, where time has been,
A rare old plant is the ivy green.

A FOREST HYMN

In this poem William Cullen Bryant expressively conveys to us the feeling of awe and reverence which inspired him when he thought of the beauty and majesty of a great wood.

THE groves were God's first temples. Ere man learned
To hew the shaft, and lay the architrave,
And spread the roof above them—ere he framed
The lofty vault, to gather and roll back
The sound of anthems; in the darkling wood,
Amid the cool and silence, he knelt down,
And offered to the Mightiest solemn thanks
And supplication. For his simple heart
Might not resist the sacred influence
Which, from the stilly twilight of the place,
And from the gray old trunks that high in heaven
Mingled their mossy boughs, and from the sound
Of the invisible breath that swayed at once
All their green tops, stole over him, and bowed
His spirit with the thought of boundless power
And inaccessible majesty. Ah, why
Should we, in the world's riper years, neglect
God's ancient sanctuaries, and adore
Only among the crowd, and under roofs
That our frail hands have raised? Let me, at least,
Here in the shadow of this aged wood,
Offer one hymn—thrice happy, if it find
Acceptance in His ear.

FARRAGUT

This stirring little poem, by William T. Meredith, is a description of the naval battle fought in Mobile Harbor, in 1864, between the Federal and Confederate forces. Admiral Farragut was in command of the Federal fleet. Both sides bore themselves with great gallantry. As we read the lines, we can see the rising sun, soon to be hidden by the smoke of battle. We can hear the drum beat, the thunder of the guns and the shouts of men. The verses close nobly by declaring that the hero fought, not that he might win fame, but that his country might be united under one flag.

GRAY-HAIRED old Farragut,
Bold heart unbroke,
Daring old Farragut,
Thunderbolt stroke,
Watches the hoary mist
Rise from the bay,
While his flag, glory-kissed,
Waits for young day.

See! 'neath Fort Morgan's wall
Black looms a fleet.
Hark! deck and rampart call,
Rolls the drum-beat.
Lads! buoy your anchor-chains
While the steam hums.
Men! to the battlement,
Farragut comes.

Now! as the hurricane
Hurtles in wrath
Squadrons of clouds amain
Back from its path,
Back to the parapet,
To the guns' lips,
Thunderbolt Farragut
Hurls the black ships.

Out through the battle's roar
Clear the lad sings,
"By the mark fathoms four,"
While his lead swings.
Steady the wheelmen five,
"Nor' by East keep her,"
"Steady," but two alive;
How the shot sweep her!

High 'neath the spars that sway
'Bove crimson decks,
Over the flames that play
Round the torn wrecks,
Over the dying lips
Framed for a cheer,
Farragut scans his ships,
Guides the fleet clear.

On by heights battle-ploughed,
While the spars quiver;
Onward still flames the cloud
Where the hulks shiver.
See, yon fort's star is set,
Storm and fire past,
Cheer him, lads—Farragut,
Victor at last.

There dares he for duty,
Duty 'bove fame,
Like summer storms beauty
Fame fickle and vain.
Plighted his true heart's troth
And bold endeavour
To Country, and South and North
One flag ever.

O! while Atlantic's West
Knows mist or gale,
While the Gulf's towering crest
Tops a green vale,
Nations shal' name thee yet
Old Heart unbroke,
Daring old Farragut,
Thunderbolt stroke!

THE BLUE AND THE GRAY

These well known lines, by Francis Miles Finch, were inspired by a visit to the National Cemetery at Arlington, where the soldier dead of the Northern and Southern armies lie side by side. Death and time, they seem to say, heal all discords, and in paying honor to the dead, enmity is forgotten.

BY the flow of the inland river,
Whence the fleets of iron have fled,
Where the blades of the grave-grass quiver,
Asleep are the ranks of the dead:
Under the sod and the dew,
Waiting the judgment-day;
Under the one, the Blue,
Under the other, the Gray.

These in the robings of glory,
Those in the gloom of defeat,
All with the battle-blood gory,
In the dusk of eternity meet:
Under the sod and the dew,
Waiting the judgment-day;
Under the laurel, the Blue,
Under the willow, the Gray.

From the silence of sorrowful hours
The desolate mourners go,
Lovingly laden with flowers
Alike for the friend and the foe:
Under the sod and the dew,
Waiting the judgment-day;
Under the roses, the Blue,
Under the lilies, the Gray.

So with an equal splendour,
The morning sun-rays fall,
With a touch impartially tender,
On the blossoms blooming for all:
Under the sod and the dew,
Waiting the judgment-day;
Broidered with gold, the Blue,
Mellowed with gold, the Gray.

So, when the summer calleth,
On forest and field of grain,
With an equal murmur falleth
The cooling drip of the rain:
Under the sod and the dew,
Waiting the judgment-day;
Wet with the rain, the Blue,
Wet with the rain, the Gray.

Sadly, but not with upbraiding,
The generous deed was done,
In the storm of the years that are fading
No braver battle was won:
Under the sod and the dew,
Waiting the judgment-day;
Under the blossoms, the Blue,
Under the garlands, the Gray.

No more shall the war cry sever,
Or the winding rivers be red;
They banish our anger for ever
When they laurel the graves of our dead!
Under the sod and the dew,
Waiting the judgment-day;
Love and tears for the Blue,
Tears and love for the Gray.

A VISION

Henry Vaughan, who had this great vision of Time and Eternity, was a Welsh poet who died in 1695.

I SAW Eternity the other night,
Like a great ring of pure and endless light,
All calm, as it was bright:
And round beneath it, Time, in hours, days, years,
Driven by spheres,
Like a vast shadow moved; in which the World
And all her train were hurled.

HOW MANY TIMES?

Thomas Lovell Beddoes was a writer of the first half of the nineteenth century, which was a time of sentiment in song. The two comparisons worked up into these verses are what critics call "conceits." Wishing to say how much he loves his lady, the poet compares his thoughts of her with all the thoughts of all the people in all the nights and days of a year, or all the drops that glisten in the starlight. These comparisons are built up with a fanciful care, but they lack the simple outburst of feeling of the true song, as given in Burns' popular ditty, "O, my love is like a red, red rose!"

HOW many times do I love thee, dear?
Tell me how many thoughts there be
In the atmosphere
Of a new-fallen year,
Whose white and sable hours appear
The latest flake of Eternity;
So many times do I love thee, dear.

How many times do I love, again?
Tell me how many beads there are
In a silver chain
Of the evening rain,
Unravell'd from the tumbling main,
And threading the eye of a yellow star;
So many times do I love, again.

THE BUTTERFLY'S FUNERAL

This poem—as the first lines suggest—is a sequel to the "Butterfly's Ball and Grasshopper's Feast," given on page 1058. The poem is filled with pretty fancies about small creatures which every boy and girl should know. It tells of a comradeship between the lower animals, and wherever they do not prey on each other there is such a comradeship.

OH ye! who so lately were blithesome and gay,
At the Butterfly's banquet carousing away;
Your feasts and your revels of pleasure are fled,
For the chief of the banquet, the Butterfly's dead!

No longer the Flies and the Emmets advance,
To join with their friends in the Grasshopper's dance,
For see his fine form o'er the favourite bend,
And the Grasshopper mourns for the loss of his friend.

And hark to the funeral dirge of the Bee,
And the Beetle, who follows as solemn as he!
And see, where so mournful the green rushes wave,
The Mole is preparing the Butterfly's grave.

The Dormouse attended, but cold and forlorn,
And the Gnat slowly winded his shrill little horn;
And the Moth, being grieved at the loss of a sister,
Bent over her body and silently kissed her.
The corpse was embalmed at the set of the sun,
And enclosed in a case which the Silkworm had spun;
By the help of the Hornet the coffin was laid
On a bier out of myrtle and jessamine made.

In weepers and scarfs came the Butterflies all,
And six of their number supported the pall;
And the Spider came there in his mourning so black,
But the fire of the Glow-worm soon frightened him back.

The Grub left his nut-shell to join the sad throng,
And slowly led with him the Bookworm along,
Who wept for his neighbour's unfortunate doom,
And wrote these few lines, to be placed on his tomb:

EPITAPH

At this solemn spot, where the green rushes wave,
In sadness we bent o'er the Butterfly's grave:
'Twas here the last tribute to beauty we paid,
As we wept o'er the mound where her ashes are laid.

And here shall the daisy and violet blow,
And the lily discover her bosom of snow;
While under the leaves, in the evenings of spring,
Still mourning his friend, shall the Grasshopper sing.

A MILLION LITTLE DIAMONDS

A MILLION little diamonds
Twinkled on the trees;
And all the little maidens said,
"A jewel, if you please!"

But while they held their hands outstretched
To catch the diamonds gay,
A million little sunbeams came
And stole them all away.

A SUMMER'S DAY

The Scottish writer of these verses, Alexander Hume, lived from 1560 to 1609, and so was a contemporary of Shakespeare. He was the first poet to describe outdoor life with simple feeling. These verses are from the best poem of its kind that had then appeared in the English tongue. "Simples" is an old word for simple remedies; "callor" means cool.

THE time so tranquil is and still,
That nowhere shall ye find,
Save on a high and barren hill,
An air of peeping wind.

All trees and simples, great and small,
That balmy leaf do bear,
Than they were painted on a wall,
No more they move or steir.

The rivers fresh, the callor streams,
O'er rocks do softly rin,
The water clear like crystal seems,
And makes a pleasant din.

WHO KILLED COCK ROBIN?

WHO killed Cock Robin?
I, said the Sparrow,
With my bow and arrow,
I killed Cock Robin.

Who saw him die?
I, said the Magpie,
With my little eye,
I saw him die.

Who caught his blood?
I, said the Fish,
With my little dish,
I caught his blood.

Who made his shroud?
I, said the Eagle,
With my thread and needle,
I made his shroud.

Who'll dig his grave?
The Owl, with aid
Of mattock and spade,
Will dig Robin's grave.

Who'll be the parson?
I, said the Rook,
With my little book,
I'll be the parson.

Who'll be the clerk?
I, said the Lark,
If not in the dark,
I'll be the clerk.

Who'll carry him to the grave?
I, said the Kite,
If not in the night,
I'll carry him to the grave.

Who'll be chief mourner?
I, said the Swan,
I'm sorry he's gone,
I'll be chief mourner.

Who'll bear his pall?
We, said the Wren,
Both the cock and the hen,
We'll bear the pall.

Who'll toll the bell?
I, said the Bull,
Because I can pull,
And I'll toll the bell.

Who'll lead the way?
I, said the Martin,
When ready for starting,
And I'll lead the way.

All the birds in the air
Began sighing and sobbing
When they heard the bell toll
For poor Cock Robin.

To all it concerns,
This notice apprises,
The Sparrow's for trial
At next bird assizes.

LITTLE VERSES FOR VERY LITTLE PEOPLE

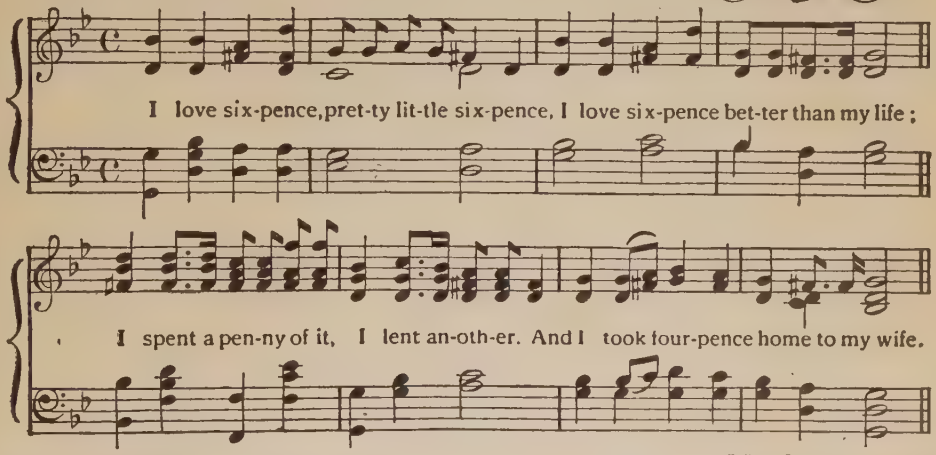
"JACKY, come give me thy fiddle
If ever thou mean to thrive."
"Nay; I'll not give my fiddle
To any man alive.

"If I should give my fiddle,
They'll think that I'm gone mad,
For many a joyful day
My fiddle and I have had."

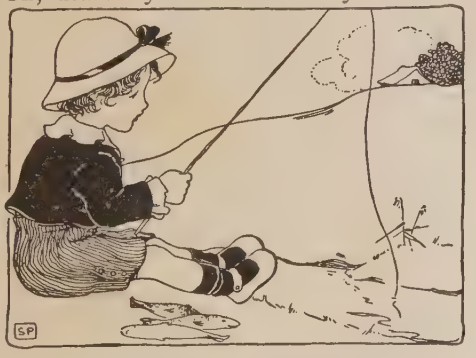
IF wishes were horses,
Beggars would ride;
If turnips were watches,
I would wear one by my side.

ROBIN THE BOBBIN, the big, greedy Ben,
He ate more meat than fourscore men;
He ate a cow, he ate a calf,
He ate a butcher and a half;
He ate a church, he ate a steeple,
He ate the priest and all the people!
A cow and a calf,
An ox and a half,
A church and a steeple,
And all the good people,
And yet he complained he was hungry.

I LOVE SIXPENCE


I love six-pence, pret-ty lit-tle six-pence, I love six-pence bet-ter than my life;
I spent a pen-ny of it, I lent an-oth-er. And I took four-pence home to my wife.

AS I was going by Charing Cross,
I saw a black man upon a black horse;
They told me it was King Charles the First;
Oh, dear! my heart was ready to burst.



LITTLE Tommy Tittlemouse
Lived in a little house;
He caught fishes
In other men's ditches.

IF you sneeze on Monday, you sneeze for danger;
Sneeze on a Tuesday, kiss a stranger;
Sneeze on Wednesday, sneeze for a letter;
Sneeze on a Thursday, something better;
Sneeze on a Friday, sneeze for sorrow;
Sneeze on a Saturday, see your sweetheart to-morrow.

COLD and raw the north wind doth blow,
Bleak in a morning early;
All the hills are covered with snow,
And winter's now come fairly.

DOCTOR FOSTER went to Glo'ster,
In a shower of rain;
He stepped in a puddle, up to his middle,
And never went there again.

TOM, TOM THE PIPER'S SON

TOM he was the piper's son,
He learn'd to play when he was young,
But the only tune that he could play
Was, "Over the hills and far away."

Now Tom with his pipe made such noise,
That he pleased both the girls and the boys,
And they stopp'd to hear him play,
"Over the hills and far away."

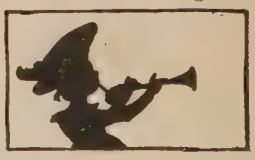
Tom with his pipe did play with such skill,
That those who heard him could never keep still;
Whenever they heard they began for to dance,
Even pigs on their hind legs would after him prance.

As Dolly was milking her cow one day,
Tom took out his pipe and began for to play;
So Dolly and the cow danced "The Cheshire round,"
Till the pail was broke and the milk ran on the ground.

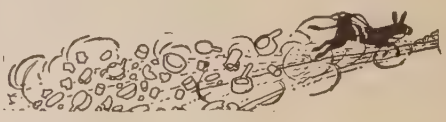
He met old Dame Trot with a basket of eggs.

He used his pipe and she used her legs;
She danced about till the eggs were all broke,
She began for to fret, but he laughed at the joke.

He saw a cross fellow was beating an ass,
Heavy laden with pots, pans, dishes, and glass;



He took out his pipe and played them a tune,
And the jackass's load was lightened full soon.



SOLOMON GRUNDY,
Born on a Monday,
Christened on Tuesday,
Married on Wednesday,
Took ill on Thursday,
Worse on Friday,
Died on Saturday,
Buried on Sunday,
This is the end of
Solomon Grundy.

PUSSY CAT, pussy cat, where have you been?
I've been to London to look at the Queen.
Pussy cat, pussy cat, what did you there?
I frightened a little mouse under the chair.

I HAD a little pony,
His name was Dapple Gray,
I sent him to a lady,
To ride a mile away.

She whipped him, she slashed him,
She rode him through the mire;
I would not lend my pony now
For the lady's hire.

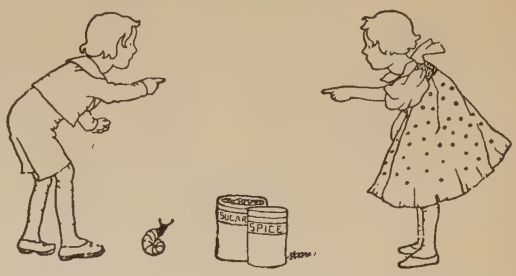
POOR old Robinson Crusoe!
Poor old Robinson Crusoe!
They made him a coat
Of an old nanny goat,
I wonder how they could do so!
With a ring a ting tang,
And a ring a ting tang,
Poor old Robinson Crusoe!

THREE wise men of Gotham
Went to sea in a bowl:
And if the bowl had been stronger
My song would have been longer.

I'LL tell you a story,
About Jack a Nory—
And now my story's begun:
I'll tell you another
About Jack and his brother—
And now my story's done.

PUSSY-CAT MOLE
Jumped over a coal,
And in her best petticoat burnt a great hole.
Poor Pussy's weeping—she'll have no more milk
Until her best petticoat's mended with silk.

WHAT are little boys made of, made of,
What are little boys made of?
Snaps and snails, and puppy-dogs' tails;
And that's what little boys are made of, made of.



What are little girls made of, made of,
What are little girls made of?
Sugar and spice, and all that's nice;
And that's what little girls are made of, made of.

THERE was an old woman, and what do you think?
She lived upon nothing but victuals and drink:
Victuals and drink were the chief of her diet;
This tiresome old woman could never be quiet.

She went to the baker to buy her some bread,
And when she came home her old husband was dead;
She went to the clerk to toll the bell,
And when she came back her old husband was well.

MARY, Mary, quite contrary,
How does your garden grow?
With cockle-shells and silver bells
And columbines all of a row.

SAM WELLER WILL NOT SEE HIS FATHER

The judge turned to the witness as soon as his indignation would allow him to speak. "Do you see your father here now?" he asked. "No, I don't, my lord," replied Sam, staring up into the lantern in the roof.

A GLANCE THROUGH THE DICKENS NOVELS

AS we did in the case of Sir Walter Scott's Waverley Novels, we are now to do with the novels of Charles Dickens. We are to make a hasty run through all these famous books before taking up those about which we are to read at greater length. It is true we have already read three of his famous Christmas books, but these are quite exceptional, and may be regarded as outside the general novels of Dickens. In the case of the Waverley Novels we first looked through the whole series in the historical order of the times they described. But with Dickens we cannot do this, as his great novels nearly all describe the life of his own time, and so we shall take them here in the order in which they were written.

THE STORIES OF DICKENS

CONTINUED FROM 2304

WE began our readings in Charles Dickens with his famous Christmas Books. He wrote a great many short stories in addition to his long novels, but we have so many of the long stories to read that we must pass over the shorter tales even without so much as mentioning their names. Nor shall we read his first book of all here. That is entitled "Sketches by Boz," and is a collection of lightly-written articles, meant at first to amuse and entertain newspaper readers, but so full of humor, kindly feeling, sympathy and real character, that they deserved the happier fate which made them into the first published book of one of the greatest English authors. "Boz" was the name under which Dickens wrote these early sketches.

Nor can we very well tell the whole story of "The Pickwick Papers" here. That was the work which made the name of Dickens famous and first brought him in the way of fortune. It is a long, rambling story, loosely but delightfully told, and any short summary of it would be of no value. Samuel Pickwick is the chief character by name—there are ninety-eight characters in the book—though it was not he who made the story so popular. He is the chairman and founder of a club named after him, which is supposed to exist "for the purpose of investigating the source of the Hampstead Ponds," but is really just a comic excuse for Pickwick and his cronies to go about together and have the most amusing adventures you could imagine a jolly, good-hearted old gentleman getting into. When "The Pickwick Papers" began appearing in monthly parts, the first few issues were not very successful, but as soon as Samuel Weller was introduced, readers everywhere were delighted, and that comical serving man to Mr. Pickwick became at once the most popular character in the stories of that time, as, indeed, he is to this day. We simply can't help liking Sam Weller, though both he and his father Tony are far from being model citizens. Before Sam came into the service of Mr. Pickwick, he was employed at the White Hart Inn in the High Street, Borough, on the south side of London Bridge; and we first see him busy cleaning boots, when a chambermaid calls to him.

"Number twenty-two wants his boots."

"Ask number twenty-two whether he'll have 'em now or wait till he gets 'em," was the reply.

"Come, don't be a fool, Sam!" said the girl coaxingly. "The gentleman wants his boots directly."

"Well, you are a nice young 'ooman for a musical party, you are," said the boot-cleaner. "Look at these here boots—eleven pair o'boots; and one shoe as b'longs to number six, with the wooden leg. The eleven boots is to be called at half-past eight, and the shoe at nine. Who's number twenty-two that's to put all the others out? No, no; reg'lar rotation, as Jack Ketch said wen he tied the men up. Sorry to keep

you a-waitin', sir, but I'll attend to you directly."

We can tell at once from this that Sam is going to give us much amusement, and he does. Indeed, Sam never speaks without raising a smile, and more often a hearty laugh. His stories are always comical, if they are not always strictly true, as, for instance, his explanation of what the twopenny rope was.

"The twopenny rope, sir," replied Mr. Weller, "is just a cheap lodgin'-house, where the beds is twopence a night."

"What do they call a bed a rope for?" said Mr. Pickwick.

SAM WELLER DESCRIBES A STRANGE SORT OF BED TO MR. PICKWICK

"Bless your innocence, sir, that a'nt it!" replied Sam. "When the lady and gen'l'm'n as keeps the hotel first began business, they used to make the beds on the floor; but this wouldn't do at no price, 'cos instead o' taking a moderate twopenn'orth o' sleep, the lodgers used to lie there half the day. So now they has two ropes, 'bout six foot apart, and three from the floor, which goes right down the room; and the beds are made of slips of coarse sacking, stretched across 'em."

"Well?" said Mr. Pickwick.

"Well," said Mr. Weller, "the adwantage o' the plan's hobvious. At six o'clock every mornin' they lets go the ropes at one end, and down falls all the lodgers. Consequence is, that being thoroughly waked, they get up wery quietly, and walk away!"

SAM WELLER'S FAMOUS APPEARANCE IN THE WITNESS-BOX

We could fill a whole part of THE BOOK OF KNOWLEDGE with stories of Sam Weller alone. He is really the life and soul of "The Pickwick Papers," and those fault-finding people who will tell you he is only a low, vulgar cockney are not to be considered as sound critics. He is a cockney; he is certainly not a gentleman, and he is by no means refined; but he is unfailingly sharp in his remarks, and often extremely witty; and he is certainly a good and useful servant to Mr. Pickwick. It is quite clear that Dickens loved his Weller, and realized that he had found in him the very best way of expressing the native wit of the lower-class Londoner, who at that time was in the habit of confusing the pronunciation of the letters "v" and "w"; that is to say, Sammy's father called his son "Veller." Sam was a witness in a very funny breach of promise case, brought against Mr. Pickwick, and we shall just take a peep at him in the witness-box.

"Call Samuel Weller."

It was quite unnecessary to call Samuel Weller; for Samuel Weller stepped briskly into the box the instant his name was pronounced; and placing his hat on the floor, and his arms on the rail, took a birdseye view of the bar, and a comprehensive survey of the bench, with a remarkably cheerful and lively aspect.

"What's your name, sir?" inquired the judge,

"Sam Weller, my lord," replied that gentleman.

"Do you spell it with a 'V' or a 'W'?" inquired the judge.

"That depends upon the taste and fancy of the speller, my lord," replied Sam. "I never had ocasion to spell it more than once or twice in my life, but I spells it with a 'V.'"

Here a voice in the gallery exclaimed aloud: "Quite right, too, Samivel, quite right. Put it down a we, my lord, put it down a we."

WHY SAM WAS QUITE UNABLE TO SEE HIS FATHER IN COURT

"Who is that who dares to address the Court?" said the little judge, looking up. "Usher."

"Yes, my lord."

"Bring that person here instantly."

"Yes, my lord."

But as the usher didn't find the person, he didn't bring him; and, after a great commotion, all the people, who had got up to look for the culprit, sat down again. The little judge turned to the witness as soon as his indignation would allow him to speak, and said:

"Do you know who that was, sir?"

"I rayther suspect it was my father, my lord," replied Sam.

"Do you see him here now?" said the judge.

"No, I don't, my lord," replied Sam, staring right up into the lantern in the roof of the court.

"If you could have pointed him out, I would have committed him instantly," said the judge.

Sam bowed his acknowledgments and turned with unimpaired cheerfulness of

countenance, towards Serjeant Buzfuz. Above all, Sam Weller is notable for what have been called "Wellerisms" ever since he first appeared in print. We can only explain a Wellerism by giving one example. Being asked to sing, he replied: "Raly, gentlemen, I'm not wery much in the habit o' singin' without the instrument; but anythin' for a quiet life, as the man said wen he took the sitivation at the lighthouse."

That is a Wellerism, and if it is a somewhat mechanical sort of wit that always uses the same device, "as the man said," and so forth, it is undoubtedly amusing as we find it in the sayings of Mr. Pickwick's famous servant. Into the endless mishaps that attended the career of Mr. Pickwick in his outings with his friends we cannot enter here. But you may be sure, it is usually Sam Weller that comes to his rescue, as he did once when Mr. Pickwick had fallen asleep in a barrow.

Some of the Many Quaint and Curious Folk We Meet in "Pickwick"

It was after a picnic lunch, Mr. Pickwick's friends had left the old gentleman alone, and an irate landlord, on whose grounds they had trespassed, caused the barrow and its contents to be wheeled to the village pound, where the beadle kept Mr. Pickwick prisoner, and the urchins tormented him until the faithful Sam appeared, and "damaged" the said beadle in relieving his master. Of the Fat Boy, of Bob Sawyer, the rowdy medical student, of the Rev. Mr. Stiggins, of Serjeant Buzfuz, the brow-beating barrister, of Dodson and Fog, the quaint lawyers, of Jingle, the actor, of Snodgrass, Tupman, and Winkle, his fellow-members of the Pickwick Club, of Mr. Wardle, the old country gentleman who entertained Mr. Pickwick and his friends at his house, of Mrs. Bardell, and ever so many other odd and interesting characters, we could say much; but as it is impossible to give anything like a description of the whole story, we can only pass from it by saying that it is a real old-fashioned English book, dealing, where it is true to life, with manners and customs that have now passed away; full of comic exaggeration, and a source of hearty laughter. It will, indeed, be not altogether to our credit if we cannot be amused by the adventures of Mr. Pickwick.

"The Pickwick Papers" began appearing in 1836, and the author started his next great book, "Oliver Twist," while the other was still unfinished, doing a part of the one and a part of the other time about. Nor had he completed "Oliver Twist" ere he was at work on "Nicholas Nickleby." Of these two books we shall read later on.

Two Long Stories That Grew Out of a Shorter One

Then, in 1840, he began as a long serial "Master Humphrey's Clock," which was to contain a number of different stories, but after a time developed into "The Old Curiosity Shop" and "Barnaby Rudge." That is to say, "Master Humphrey" was, in a way, the parent of these two far longer and much finer stories, about which we shall read further.

"Martin Chuzzlewit," begun in 1843, we must also read together, and we have already read "A Christmas Carol" and "The Chimes," which came next from his magic pen. "Dombey and Son," published in 1849, and "David Copperfield," begun in monthly parts in the same year, we have yet to read.

In 1852 "Bleak House" began as a serial story. It was a story of that day, and most of the life described in it, even the very places, have now passed away. With what is the main object of that story we need not greatly concern ourselves. In fact, it is neither easy to explain nor to understand. The old Court of Chancery existed to dispose of the fortunes of people who died and left their wealth to relatives not yet twenty-one, and to put right doubtful wills and bequests.

A Warm-Hearted Book That Has a Very Cold Name

What happened very often was that the wily lawyers of Chancery swallowed up all the money and took years to settle the cases, with the result that, at the end, the people who had been left the fortunes had grown old and never had the privilege of receiving them. It was an evil system, but is now greatly improved, and perhaps the way Dickens attacked it in this book helped to have it improved.

Although the story has a cold name, "Bleak House" is really one of its author's fine, warm-hearted books, full of quaint and interesting people. It

begins by telling us of the case of Jarndyce and Jarndyce, which had been before the Court of Chancery for so many years that most of the money at stake in the first instance was now in the pockets of the lawyers.

ESTHER SUMMERSON, THE HEROINE WHO TELLS THE TALE OF "BLEAK HOUSE"

It is a woman who is supposed to write the story—Esther Summerson—though sometimes her part stops and the author takes the story in hand himself. Esther tells us that when the woman with whom she lived died rather suddenly, almost her last words spoke of Jarndyce and Jarndyce; so that she began to wonder what this strange case had to do with her. For Esther didn't know her parents and was quite alone in the world. By a mysterious friend she was sent to a school and well cared for, her own gentle and loving nature being, perhaps, the real reason of that; and when she was a young woman the same unknown friend arranged for her to become companion to a young lady, Ada Clare, who was concerned in the Jarndyce case. Ada's cousin, Richard Carstone, was also concerned in the case, and all three met in London on their way to Bleak House in the country. When they all met for the first time, none of them had ever seen their mysterious friend, except for Richard having once had a glimpse of him, he thought.

Their friend turned out to be Mr. John Jarndyce, the master of Bleak House, one of the kindest-hearted old bachelors that ever lived. Esther was at once made mistress of Bleak House, to her intense surprise, and she had to watch over Ada and Richard, for Mr. Jarndyce put the greatest trust in her.

THE GOOD MR. JOHN JARNDYCE AND THE SELFISH HAROLD SKIMPOLE

Bleak House was a really fine mansion, and only one of its inmates had a selfish heart. That was Harold Skimpole, a charming old gentleman, whom Mr. Jarndyce had befriended, and who seemed the very picture of every goodness, but was at heart a selfish, lazy old fellow; a sponger, in short. Their life at Bleak House was happy and full of interest at first; Richard was clearly falling in love with Ada, and Esther loved Ada sincerely. But many troubles were in store for all. Richard was not always wise in what he did; the Jarndyce case dragged on and kept all in terrible suspense, for it involved the fortunes of both Richard and Ada.

We cannot follow the story, however, except to say that in the end, when poor Richard had married Ada and the case was at last concluded, their fortunes had vanished, and, Richard being stricken with consumption, the turf had been laid upon his grave ere his little son was born. Esther also discovered the secret of her parentage, but best of all was her marriage with Dr. Allan Woodcourt, the great-hearted surgeon who strove so nobly to save Richard's life. Their new home they also named Bleak House, and though John Jarndyce lived on at the old house of that name and watched over Ada, the two Bleak Houses were in constant communication.

THE LESSON DICKENS TEACHES IN THE STORY CALLED "HARD TIMES"

"Hard Times," which began to appear in 1854, was the next novel by Dickens. It is also a "story with a purpose." Although John Ruskin, the famous art critic, thought it in some respects the greatest work of Dickens, that is not the general opinion.

There is a Thomas Gradgrind, who is a great believer in statistics; he thinks you can tell exactly the happiness and misery of a place by finding out how many births and deaths, and how much wages the people earn, what the rents of the houses are, and all that sort of thing. But he is a good-hearted man, for all his faith in these dry, deluding figures. He persuades his daughter Louisa to marry Josiah Bounderby, banker and cotton master, who is much older than she is, and by no means a lovable person. But her brother Tom is in Bounderby's office, and she wants to please her father and to help Tom.

Of course, such a marriage could not turn out happily, and as Tom steals money and runs away, matters are worse than ever. Mr. Gradgrind lives to understand that it is not wise to trust to mere statistics, and to realize that human hearts and their feelings cannot be reckoned like sums in arithmetic. When Bounderby dies, Louisa is able to marry according to her own choice, and she is happy in the end.

In "Little Dorrit," which Dickens wrote a year after "Hard Times," we have a contrast between poverty and riches. The first part of the story is all about the unpleasant associations of the Debtors' Prison, in which some members of the Dorrit family had to pass some years of their life. With the exception of Amy, who is known as Little Dorrit, and Frederick, her father's brother, who has to play the clarionet for a living, all the Dorrits are a pitiable lot in the days of their debt and poverty, and it is only natural that when they come into money they should prove to be as contemptible in their pride as they were pitiable in their poverty. Little Dorrit, however, is unchanged through all her trials, and is ever sweet and affectionate. She marries a worthy young man named Arthur Clennam, and leaves us with a future of assured happiness in store, none deserving that better than Amy.

THE ROMANCE OF THE FRENCH REVOLUTION CALLED "A TALE OF TWO CITIES"

Next from the busy pen of the great novelist came his fine romance of the French Revolution, called "A Tale of Two Cities." The two cities are London and Paris, and the state of life in them during the awful years of the Revolution is very vividly described. The story is quite unlike all the other novels by the same author. For they all rely for interest upon the characters described in them, rather than upon the thrilling events which take place.

It is the opposite with "A Tale of Two Cities." The real hero of the story is Sydney Carton, a true gentleman at heart, who has, unfortunately, taken to foolish ways of life, and ruined all his chances of worldly success. Dr. Manette, a French gentleman, who has been imprisoned in the Bastille of Paris for eighteen years, is at length liberated and restored to his daughter Lucie, who marries one called Charles Darnay, son of the Marquis St. Evrémonde, and a refugee in London.

For Lucie, Sydney Carton has a strong and self-sacrificing love, and her marriage, of course, makes everything hopeless to him. But Darnay, at great risk, goes to Paris to try to help a friend in distress; Lucie and Dr. Manette go there also, and Sydney Carton as well. In the awful days of the Terror, when many innocent people were beheaded every day without a proper trial, and on the mere word of any informer, Darnay is arrested. But, by managing to take his place in the prison, Sydney Carton saves the life of Lucie's husband, and allows himself to be executed instead.

THE LAST WORDS OF SYDNEY CARTON AND THE STORY OF "PIP"

It is really a great story of self-sacrifice, and the last words of Sydney Carton before he is executed are: "It is a far, far better thing I do than I have ever done; it is a far, far better rest I go to than I have ever known."

In 1860, "Great Expectations" began to come out in monthly instalments. This is one of the novels in which the hero is made to tell his own story, and a most interesting story it is. He is known as Pip, the nephew of a village blacksmith, who brings him up. He is a poor lad, who dreams of one day being a "gentleman," a dream that seems most unlikely ever to come true. When he is about seven he meets an escaped convict in the village churchyard, and is frightened by the man, whose name is Magwitch, into bringing him a file to remove his fetters and some food to eat. The convict escapes to New South Wales.

Pip, meanwhile, becomes the playmate of little Estella, the adopted child of Miss Havisham, who is the daughter of a rich brewer. Miss Havisham has been disappointed in love, and has a hatred of men, so that she is teaching the beautiful Estella to break men's hearts when she grows into a fascinating woman, and Pip is to be her first victim.

HOW PIP'S "GREAT EXPECTATIONS" WERE NOT ALL REALIZED

Later on, Pip is bound apprentice to his uncle; but when he has served only half his time, he is told that some mysterious benefactor has provided for his education, and that he may now regard himself as a young gentleman with "great expectations." It looks as if the dream were to come true, after all. His friend was none other than Magwitch, now a rich farmer, and when Pip was twenty-three the ex-convict came back secretly to England to see him and give him a fortune. But Magwitch was recognized and arrested, being condemned to death at Newgate, and his whole fortune confiscated, so that Pip was penniless after all, and had to become a clerk. Still, he had another "great

expectation": to marry Estella, his former playmate, who was really the child of Magwitch, and who was to inherit Miss Havisham's riches. However, she married a man who used her very badly, squandered her fortune, and left her in most unhappy circumstances when he died. Pip was now a partner in his firm, and he still loved Estella, so that perhaps he married her after all; but the story ends without telling us, and leaves that to be guessed, though there is little doubt of it, as Estella had always really loved Pip, and only her old pride led her away from him at first. Neither had any false pride left, so that they could look to a happy future.

"Our Mutual Friend" the last great novel of Charles Dickens

The last great novel which Dickens finished before his death was "Our Mutual Friend," one of his heartiest and most delightful stories. John Harmon is the "mutual friend," meaning that he is the friend of the Boffins as well as the Wilfers, but the word "mutual" is wrongly used, as "common friend" would be correct in such a case. The son of a hard-hearted old contractor, who turns him out of doors for protesting against the way his sister had been treated, John goes abroad by the help of Boffin, who worked for old Harmon, and is supposed after a good many years to be dead. But he returns to England to find that his father has died, leaving his fortune of $500,000 to him, on condition that he marries Bella Wilfer, and, if he does not, that the money shall go to the Boffins. John greatly dislikes the idea of having to marry one he has never seen, and decides to conceal his real name for a time, calling himself John Rokesmith, under which name he takes service with Mr. Boffin, who recognizes him, but does not let John know his secret is guessed.

Mr. Boffin's clever little plot to test the love of John and Bella

Boffin, however, contrives a meeting between Bella and John, and John falls in love with her sure enough. Then, in order to test Bella's love, Boffin pretends to be angry with John for aspiring to marry her, and becomes unfriendly to him, so that if she does marry him she will think she is marrying a poor man, and losing the fortune provided by old Harmon's will should John Harmon turn up and be willing to marry her. But Bella loves John for his own sake, and does not hesitate to marry him and to live with him on his small earnings. After their first child is born, however, good Mr. Boffin puts all right, and John has the joy of taking his wife to a beautiful house where, now possessing his own fortune, John Harmon and his wife live in happiness and luxury with their dear old friends, Mr. and Mrs. Boffin.

Of course, this is a very bare outline of the story, and we must all read the book for ourselves. It contains a number of characters who are as well known as though they had really lived—better known, in fact, as they live for ever in the pages of Dickens and in the memory of his readers. All his books are rich in this way, and there are few of them that do not give us a picture of a man or woman we shall never forget. In "Our Mutual Friend," for instance, apart from the principal persons already named, there are Mr. and Mrs. Podsnap, both pompous, self-satisfied persons, who think they are in "society" and very superior to ordinary people. Hence we call persons of that class "Podsnaps."

Silas Wegg, with the wooden leg, and Jenny Wren, the doll's dressmaker

Then there is Silas Wegg, with the wooden leg, who kept a fruit-stall and wrote poetry like this:

> Beside that cottage door, Mr. Boffin,
> A girl was on her knees;
> She held aloft a snowy scarf, sir,
> Which (my eldest brother noticed)
> fluttered in the breeze.

But young folk will be most interested, perhaps, in Jenny Wren, the dolls' dressmaker, who is certainly one of the best characters in the whole story.

Of "Edwin Drood," the last work on which Charles Dickens was engaged at the time of his death, in 1870, it need only be said that this is an unfinished story of mystery, and though many efforts have been made to complete it by other writers, none seem to have been quite successful, and the book remains, like one of those broken columns we see in graveyards, to remind us that death overtook the great author, whose magic pen had given so much entertainment to his own and later generations, while he was still at the height of his power and inventive genius.

THE NEXT STORIES OF FAMOUS BOOKS ARE ON 2563.

A growing bone differs from a grown-up bone. On the right are shown the canals and red blood-cells of a grown-up bone. On the left are the growth-cells of a growing bone The dark part on the small middle picture shows the growth-power of a child's bone, which disappears as the bone grows larger.

HOW YOUR BODY IS BUILT UP

CONTINUED FROM 2368

WHEN the bodies of animals began to develop into more beautiful and complicated forms, when they became larger and able to do a greater variety of things, it was necessary that the body should produce in itself some hard parts which would serve like a scaffolding to hold the body together and for the muscles to pull upon. When we see great buildings made nowadays, by first of all putting up skeletons of iron or steel, as shown on page 611, we can get an idea of one of the many uses of these hard parts of the body. Perhaps the very first use that hardness was put to in the body was protection, as we see to-day in the shell of the snail and the oyster; and we shall soon learn that some of our own bones exist mainly for this purpose.

We may call the hard part of an animal its *skeleton*, and if we compare such an animal as a lobster with such a fish as a herring we shall learn the first interesting thing about skeletons. It is that an animal may have its skeleton outside its body or inside its body. The lobster's skeleton is outside its body, and its muscles are inside its skeleton. In the case of the herring it is the other way round. The older kind of skeleton is the lobster's kind, and when we study all the forms of animal life we learn how to trace the beginnings of the newer kind of skeleton which has the rest of the body outside it, and which we see in the fish or in ourselves. The animals that have their skeleton inside their bodies belong to the division called *vertebrates*, from the name, *vertebræ*, of the little bones that are piled against one another to form the backbone. So, instead of vertebrates, we may say backboned animals, and that comes to the same thing.

The animals that have no backbone at all are called *invertebrates*, a large word that means simply "not backboned," and many of these are quite familiar to us and have already been described in this book. For instance, oysters, jelly-fish, snails, moths, butterflies, and sponges, are examples of invertebrate creatures.

By far the most important and wonderful animals in the world are the backboned animals, and we also belong to this great class. We find that we can arrange the backboned animals into a few great groups, and the real way to understand our own skeleton and bones is to study the development of the skeleton from the simple backboned animals upwards.

The lowest kinds of backboned animals are the fishes, and although the first fishes were very humble and simple compared with even a herring, a herring will do quite well for our present purpose. When we open a herring at breakfast, we see that its head is placed at the end of a great column of small bones. This column is its backbone, and the small bones

are its vertebræ. It would be easy to spend many pages in discussing how the skull comes to be formed at the end of the backbone, but we have no room here for that great question. At any rate, the skull contains the brain, and the brain runs down from the head through the backbone, or spine, in the form of a long cord of nervous matter, which is called the spinal cord. The great business of the bones of the head is to protect the brain.

THE WONDERFUL DEVELOPMENT OF THE FISH'S FIN IN HIGHER FORMS OF LIFE

That is true in the case of the herring, and it is true in the case of ourselves. We could scarcely get through a week if we had not the skull to protect the brain. And so now we can learn at once that, even in the vertebrate animals, the most important part of the body is still inside the skeleton and not outside it.

But if we consider the herring further, we find something lacking in him which we know very well in the case of the frog or the horse or ourselves, and that is limbs. We must go to the next group of vertebrates, called the *amphibia,* to find these. Any frog will soon teach us what limbs are. The history of them is that they were developed from long side fins which the fishes invented. Now, when we look at the skeleton of a frog, we see at once that it consists of two parts. One is the part which lies along the length, or the *axis,* of the frog, and this is usually called the *axial* skeleton. It is different in some ways from what we saw in the herring, but it is really the same thing as the herring's skeleton, although, in addition, the frog has four sets of bones projecting sideways and outwards from the axis of its body, which are its four limbs.

THE MARVELOUS UNITY IN ALL KINDS OF CREATURES FROM A FROG TO A MAN

There is no exception to the rule that of all the thousands of kinds of vertebrate animals above the fishes, from the frog up to man himself, every one, without exception, has four limbs, never more and never less, at some stage in its history. This is true of the whale and the seal, and it is even true of the snake, though in these and some other animals one or both pairs of limbs may have become so small that they do not show when the animal is grown up. It is one of the most interesting things in the world to find this wonderful unity of plan, showing itself without exception onwards from the remote time when the side fins of the fish first yielded to the four limbs of such a creature as the frog. No matter whether the creature is a crawling snake or a bright lizard running quickly in the sun, or a whale swimming in the water, or a bird flying in the air, or a dog or a man, the rule is that its skeleton is formed on the principle of a backbone made up of little pieces, but stretched and hollowed out at the front end to hold the brain; and of two pairs of limbs, one in front and one behind.

Another thing we notice about the skeleton of all these creatures—a thing which greatly adds to their grace and beauty—is that it has two sides which are perfectly like each other. This character about a thing is called *symmetry,* which simply means with-measuring. You can measure one arm against the other, and so on.

A MIRACLE THAT WE ALL DO EVERY DAY OF OUR LIVES

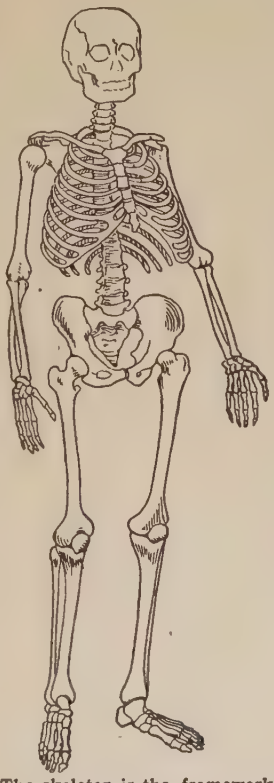
This two-sided symmetry is part of the plan of the body, and it applies not only to the skeleton upon which the body is built, but also to everything. It is not always quite exact, for we find that two sides of the same face are not exactly the same; that the two arms are not exactly the same length. But still, this two-sided symmetry of the body is a thing we can all see, and it is based upon the two-sided symmetry of the skeleton.

Now, we compared the skeleton with the steel framework of, shall we say, some big modern hotel, and it *is* our framework; but it is much more, and before we go on to look at it more closely we should know what all its uses are.

This framework is not the framework of a thing that is to stand still, but of a thing which is to move. A tree has a harder part which is, in a sense, its skeleton; but a tree is a plant, and the rule about plants is that, as they can feed on air and light and earth, they can stay where they grow. But an animal's food is of very special kinds, which are not to be found everywhere, and as its food will not come to it, it must go in search of its food. Therefore, one of the great marks of an animal is that it moves about. Its framework, then,

has to be of a very special kind, for the animal moves not because it is blown or pushed from without, but because it is able to bend certain parts of its body upon other parts of its body. We may never have thought about it, but the mere taking of a single step is a miracle, and the men who have spent twenty years in studying nothing else than that know that the more we study it the more miraculous it is. But all human beings are like that; they go wandering away to find wonderful things, though, wherever they may happen to be, there is infinite wonder under their very noses.

It is plain, then, that it will not do to have a skeleton made all in a piece or made of pieces that are buckled firmly together like the framework of a house or a ship. So, wherever movement is going to be required, we find the skeleton made of separate pieces with joints between them. We have never thought much about joints, perhaps, but engineers have to make joints whenever they build a motor-car or a steam-engine; and they have to keep those joints working smoothly if they can, but no engineer ever made a joint one-thousandth part as wonderful and perfect and durable as any of the scores of joints in our body. Now, the bones have no power of movement in themselves. If they are to move, something must pull them. The things which pull them are the muscles, and the rule about a muscle is that it runs from one bone to another *across a joint.* When the muscle shortens, it bends the one bone on the other at that joint.



The skeleton is the framework of the body, and is made up of more than 200 separate bones.

Plainly, then, the skeleton is very much more than a framework for the body, but we have not discovered all its duties yet. The skull and the backbone are not merely supporting, but protective. Within them there lies the precious nervous substance which guides and directs the whole of the body. Lastly, as if they had not enough to do, very many of the bones contain, inside them, the millions of cells which are ceaselessly engaged in turning out new red cells for the blood. Sometimes the red cells of the blood are destroyed too quickly, and have to be made more quickly than they ought to be. Then we find that the various bones, such as, say the shinbone, which we may have thought of as if it were a mere supporting rod for the leg, get filled more and more with the living cells which make red cells for the blood—so much so, that if the need for an extra supply of red cells continues, the bony part of the bone will almost disappear, and it may become easy to break. It is well for us to know this, because we are so likely to think of our skeleton as if it were something lifeless inside us, and nothing could be further from the truth.

If we go back to the fishes again for a moment, we shall learn that the bones begin in the shape of something which is not really bony, but gristly. The proper name for gristle is cartilage, and most of our bones are made of cartilage to begin with. Then, by a wonderful process, true hard bone is laid down inside the cartilage in a fashion so wonderful that, compared with it, the building of a breakwater under the sea is easy. The bones of small children are not completely bony; they are more gristly really, and sometimes, in a case where the bone of a grown-up person would have broken, the bone of a child simply bends instead of really cracking, just as the green branch of a tree will bend instead of snapping. So this kind of fracture is called a "green-stick fracture." If we think for a moment, we shall see that no little boy or girl could grow up if his or her bones were like those of grown-up people,

only smaller. If a little boy's bones were finished things, there would be no possible way of enlarging them to perhaps three times the length that they were, and two or three times the thickness. Thus, a growing bone is vastly different from a grown-up bone. The inside of a grown-up bone is busy making red blood-cells, but the outside and the ends of it are doing nothing. The bone is made, and there it is. On the other hand, the outside and the ends of a child's bone are as busy and active as any other part of his body, for they are building.

THE TINY SPECKS THAT WORK FOR US AND BUILD UP OUR BODIES

Perhaps some day you may have a chance of seeing for yourself through the microscope the wonderful way in which the bones are built—some cells laying down new bone; other cells coming along and scooping it out just where it ought to be scooped out, and so on. But I tell you here that the mind of the wisest and soberest man may almost reel at such a sight—when he asks himself how and by what knowledge these tiny specks of living matter do, each of them, their tiny work in the dark for the good of the body, as to the very existence of which it cannot have the smallest notion. Perhaps the people who say that human life is not worth while, and ask what is the good of us all scurrying backwards and forwards, living and dying, and soon being forgotten, may learn from the building of a bone that men and women are engaged in making something just as much beyond their imagining as a man's body and life and thoughts and deeds are beyond the imagining of the tiny cells that built his bones.

Bones of a finger joined by the ligaments, or the things that bind the joints.

It takes years to know the skeleton thoroughly, to understand the use of every little part of every bone; to be able to recognize even a small piece of any bone when we see it; to know whether it is a human bone or the bone of an animal, and to know which side of the body it comes from. Knowledge of that kind is necessary only for the doctor. Here, however, we can learn some of the great facts about the skeleton, especially with the help of some pictures. Pictures of bones are, perhaps, not beautiful, but that is because we do not look at them in the right way. The bones are absolutely necessary to our life; they are most exquisitely made for their purpose, and the way in which they are made is a perpetual miracle. So there is beauty enough even in bones if we could see it.

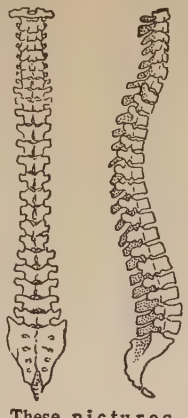
Let us begin with the axial skeleton, which, as we have seen, is the oldest part of the skeleton; and with the oldest part of it, which is the backbone. This is made up, we know, of many small pieces, resting upon one another, and that fact has two interesting meanings. One is that all creatures which have backbones are said to have descended in the remote past from a creature whose body was made up of many pieces very like each other, joined together—such, for instance, as a worm. Even the human body has very many traces in its structure of this descent from a creature whose body was made from pieces called segments. Now, just as the segmented structure of the worm helps its movement, so in almost every one of our movements we benefit by the fact that our backbones are made up of little pieces. If the backbone were really a single bone, our lives would scarcely be possible. Even when we move our arms only, we alter the balance of the body, and it is necessary that the curve of the backbone be slightly altered. One of the uses of exercize, and especially of play and games for children, is that they make the growing backbone supple, and help us to get control of it, so that we are not clumsy when we grow up.

HOW IT IS THAT WE CAN STAND ERECT WITHOUT FALLING

The different vertebræ that make up the backbone differ very much in size and shape. Those in the neck, for instance, are very much smaller than the large ones in the small of the back, which have a great weight to carry; those between the two are different again, because they have attached to them the ribs—the long, curved, slender bones which help to make the wall of the chest. We find that in all sorts of animals, as well as ourselves, the shapes and even the number of the different

vertebræ correspond wonderfully. For instance, there are seven vertebræ in the neck of practically every mammalian animal, as there are in ourselves. The giraffe, with its very long neck, has seven vertebræ, just as you and I have, and just as the whale has, though it seems scarcely to have a neck at all.

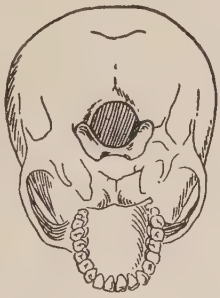
There are two great differences between the backbone of man and the backbones of other animals. One is that the backbone of man is very much shorter. In most animals the backbone runs right down into the tail, and there are vertebræ in the tail, as there are anywhere else. But the tail of man is only represented by four tiny vertebræ, which have got squeezed together into a single small bone, and which are of no use, and perhaps are even growing smaller still in mankind.



These pictures show the backbone seen from behind and from the side. Below are views of a single bone.

The lower bone shows the hole through which the spinal cord passes down the backbone from the brain in skull shown below.

The other great difference is vastly more important, though you might think nothing could be more important than the almost complete absence of a tail. It is the way in which the backbone of man is curved. There is a great difference between the curve of a baby's backbone and that of a grown-up person. In the baby and in the four-footed animals, and even in the half-erect monkeys, the backbone is so curved that the weight of the body is bound to fall forwards unless a very special, and, after a time, a very tiring, effort is made. A dog can be made to walk on its hind legs, but this is not natural to the dog, and needs a special effort. But the curve of the backbone in ourselves after we have passed the first baby stage is quite different; and, as the body is built upon and round the backbone, the result is that in ourselves, and in ourselves only, the weight of the whole upper part of the body tends to roll not forwards, but backwards. On the front of our hip-joints we have two great straps of strong fibres, called ligaments, which prevent our heads and trunks from rolling backwards when we stand up. Other creatures have these bands of fibres, but in them they are tiny, while in us they are the biggest and largest in the whole body. It is because our backbones are curved as they are, and because we have these bands of fibres in front of our hip-joints, that we can stand erect with scarcely any effort at all. This means that we can use our arms not for mere walking or standing, but for all the many things, like writing and sewing, which help to make us human.



This picture shows the hole at the base of the skull where the backbone fits. Through this hole, down a tube in the backbone, the brain sends messages over the body.

If we look at a single vertebra — not taking any one in particular, but taking an average vertebra, or, as we say in science, a typical vertebra, something corresponding to our general notion of what a vertebra is— then we find that it is a very irregular, and yet a very regular, piece of bone. It has a solid piece called the body, and these bodies are piled upon each other like a pile of coins, and so make the spinal column, or backbone. Opposite the body there is a point projecting, and we can readily see or feel the long row of these points in ourselves or other people, running down the middle of the back. These points, and the others at the side of the vertebra, have muscles and strong cords of fibres attached to them. The vertebræ are so beautifully and perfectly bound together in this way that it is practically impossible for any accident to disjoint or dislocate any part of it unless it is broken as well.

But the other great feature of the vertebra that we notice is a large hole in the middle of it. When the vertebræ are all put together to make the backbone, these holes go together to make a long tube, which opens at the topmost vertebra, and runs right down almost to the end of the backbone. Lastly, if we see a number of the vertebræ put

together, we shall find that even though they are so beautifully and tightly jointed, yet between every two vertebræ on each side there is a hole.

How all our thoughts and feelings are carried through a tube

Now, the tube made by all the vertebræ put together holds the spinal cord, without which we cannot move or feel or live; and the little holes at the sides, between every two vertebræ, carry the great spinal nerves which leave the spinal cord, and then are distributed to every part of the body, even to the skin of the smallest toe—as you will know if you have a corn; and these nerves carry from the spinal cord all the orders to the muscles, and to the spinal cord all the feelings from the skin, and so on.

Now, it is plain to us at once that there must be some great hole in the skull, which, so to speak, lets the spinal cord through from the skull into the spinal column; and that is so. When we look at the skull as it is balanced upon the backbone, the most noticeable thing at the base of it is a large hole, and on each side of it there is a very smooth little place. These smooth places fit on to corresponding smooth places on the top vertebra, and every time we move our head the skull rocks on the top vertebra at these two places. The hole between them exactly corresponds to the large hole in the top vertebra—which is, indeed, scarcely more than just a ring of bone—and it is here that the lowest part of the brain is continued into and becomes the spinal cord. It is the brain that feels, and the brain that wills, and every message from our body and limbs to the brain travels along the nerves to the spinal cord, and then through this great hole at the base of the skull up into the brain. Every message from the brain passes out through the spinal cord to the nerves and then to the limbs.

How the spinal cord floats in the tube and is protected

The spinal cord is wonderfully protected by the backbone. Inside the backbone it lies enclosed in a sheath or coat filled with fluid, in which it floats. Thus a blow upon the backbone—unless it is a very hard one—and the movements of the backbone, do no harm to the spinal cord; it does not feel them, for the water-bed in which it floats protects it. Also, the backbone and all the muscles round it, protect the spinal cord very perfectly from the sun. The one place where it is not quite so well protected as anywhere else is the back of the neck, and in people who are not very much accustomed to the hot sun, this is the place where they need to protect themselves from what we call sunstroke. If we allowed our hair to grow long, and if we all had it hanging over the back of the neck as a young girl has, then even this one place would be protected too. But, as it is, there is very good sense in putting a handkerchief, or something of the kind, over the back of the neck in very hot weather, and so protecting the one place where the central part of the great nervous system is rather more exposed than anywhere else. But remember that even here Nature has provided a protection in the form of the hair, which helps very greatly to protect the brain itself from sunstroke.

The backbone round which our bodies are built

At its lower end the spinal column is jointed to the great hip-bones, from which the bones of the leg spring. At this part of the spinal column we find five vertebræ jointed together into one bone. Long ago it was supposed that the soul lived in this bone, and it is still known as the sacrum, or sacred bone.

Higher up, below the neck vertebræ, and above those that make the small of the back, is the row of twelve vertebræ from which the ribs spring—twelve on each side. The number is the same in men and women; not one less in men, as some people imagine. Most of the ribs in front are joined on to the breast-bone, which you can feel in yourself very easily, and this bony case contains the chest inside it; while outside it are placed the collar-bone and the shoulder-blade, from which spring the bones of the arms. If now we just remind ourselves that the skull is balanced on the top of the backbone, we shall see how much good sense there is in such a saying as that good homes are the *backbone* of any nation. It is round and upon the backbone that everything is built, and without it everything else would go to ruin.

THE NEXT PART OF THIS IS ON PAGE 2569.

WHY IS GRANNY'S HAIR GRAY?

CONTINUED FROM 2354

THE color of the hair depends upon the quantity of coloring matter that it contains. That is to say, hair containing a great deal of coloring matter, or pigment, as it is called, is very dark; hair containing very little is very light. Now, the production of this coloring material depends upon the whole body being in a good state of health, and able to perform all its functions, and it is controlled to a very large extent by the nervous system.

If anything happens to go wrong with this control, either as the result of disease or the wearing out of nerve power in old age, then the pigment gradually ceases to be produced, and the hair becomes gray, and then quite white. When it is white there is no pigment left in it.

Sometimes, we know, sorrow and trouble will turn the hair gray. This is the result of exactly the same process, only in this case the failure to produce coloring matter, or pigment, is caused by anxiety and sorrow or worry instead of by old age or disease; but in both cases it is the power of nutrition that is affected, when the hair turns grey.

WHAT MAKES OUR EYES BLINK?

The real object of the blinking of our eyelids is to keep the front of the eyeballs constantly clean. The blinking itself is done by means of muscles in the eyelids, and the cleaning is done by our tears. In fact, that is really what tears are for. The fluid which we call tears is secreted in a little gland and carried along a canal, or duct, to the eye, and when our eyelids move up and down in blinking, this watery fluid is poured all over the front of the eye, and it washes away any particles of dust or other irritating substance that may be present. Some animals—snakes, for example—have no eyelids, and therefore never blink and in these creatures there is a hard film, or scale, over the eye to protect it from injury and dirt.

WHY DO WE SOMETIMES FAINT AT VERY SUDDEN NEWS?

Fainting may be due to various causes, one of which is stoppage of the blood supply to certain parts of the brain, and this happens sometimes as the result of a severe or sudden emotion. The result of such a shock to the mind is a sudden contraction of the blood-vessels, which causes the person to become suddenly pale or white, by preventing the blood from reaching the head. When this happens, a person falls

down in a faint. The falling down is Nature's attempt to put things right because, when one is lying flat on the ground, it is easier for the blood to reach the brain than when one is standing upright. When people faint in this way, they should be allowed to lie flat and the head should be kept low until they recover consciousness.

How is it that when a worm is cut in two it still lives?

All animals except the very lowest depend upon what we call a nervous system, which controls the power of movement, and so forth. Now, when this nervous system is all heaped together in the form of the brain, as it is in man and the higher animals, the life of the creature depends upon that brain being uninjured. But in lower creatures, like the worm, the arrangement of the nervous system is different. It is more scattered over the body, and so, when a worm is cut in half, there is enough nerve matter in either half of the worm to enable it to keep living.

Could we walk without our toes?

There is no doubt at all that we could walk without toes, but we should not be able to walk nearly so well nor so gracefully, nor so safely, for the simple reason that our toes spread out over the ground to a certain extent, and so give us a greater space upon which to balance our bodies. But, of course, you can easily understand that in these civilized times, when everybody wears boots, the toes themselves are really very little used. In the early days of the human race, however, they were very valuable, and were capable of much more movement than they are now. A person without toes could easily walk, but his steps would be somewhat uncertain, and his movement more restricted.

What is hydrophobia?

Hydrophobia (fear of water) is the name given to a disease in man which is the result of the bite of a dog which is ill of a disease called rabies. It gets its name from the fact that the sick person cannot swallow liquids and is thrown into a dreadful state of fear at the sound or sight of water. It is a mistake, however, to say that a dog which has rabies runs away from water. On the contrary it drinks water greedily. Hydrophobia is a very dreadful and fatal disease. A person who has been bitten by a dog should always be treated at once, and the dog should be examined to make sure that it has not rabies, especially if it has hitherto been a gentle animal, or has bitten a child or grown-up person for whom it has always shown affection. It is not true that the bite of a dog which has not rabies will cause hydrophobia. A healthy dog need not be killed because of biting.

Will frogs and fishes some day turn into animals like horses?

I suppose you have asked this question because you have learnt that animals were not always as they are now, and so you wonder whether frogs and toads and fishes will in time change to something else. The answer is "No," and the reason is that these animals represent the result of many, many generations of gradual changes until they have been produced in the special form in which we now find them. They are, in fact, like a completely manufactured article, and are therefore as perfect in their way as the horse is in its way. The creatures from which frogs and toads and fishes sprang are not like any of these any more than the raw cotton is like a fully-made shirt.

Why do we ever stop growing?

What we call growth is the power the cells of the body have of taking nourishment into themselves and so becoming larger, and of dividing and giving rise to other cells like themselves. This power, however, is limited, and every kind of cell can only grow within the limits of its own law—the law of growth. No matter how much food or exercise is taken, the law of growth prevents any number of cells becoming more numerous or larger than a given limit. When the body is young the growth is very active, but as the body grows older the limit of growth is gradually reached, and finally growth ceases altogether.

Why are there some illnesses that we cannot get twice?

This is one of the greatest questions in science to-day, and many very clever men are trying to find out the exact reason why we never suffer twice from certain diseases; in other words, how it is possible for people to become *immune*, or free from these ailments. There is no doubt of the fact that when

people have had small-pox or measles or scarlet fever once, they very seldom suffer from them again, even if there be an epidemic all round them. In some way or other the tissues of the body have become changed as the result of the first attack, and are thus made better able to resist that particular kind of infection. Some people think that our bodies have become accustomed to that infection, so that it does not infect them any more; but, whatever the exact nature of the resisting power is, there is no doubt that it is a very common process in many parts of our nature.

WHY DO WE GET HOARSE WHEN WE HAVE A COLD?

We must understand that the voice is produced in a little box in the throat, called the larynx, in which are two membranes called the vocal chords, stretching across the box, and, by their vibration and contraction, producing the different noises and sounds which make our voice. Now, when we get a cold in the throat these vocal chords swell up and become filled with fluid, and are therefore thick and irregular. The result of this is that they are unable to produce a clear note, and so the voice sounds thick or hoarse. It is as if the string of a fiddle were soaked in hot water in places until it had become swollen or thick. It would then be unable to vibrate properly, and we could not produce a clear note with it.

WHY CAN WE HEAR SO MUCH BETTER OVER WATER THAN OVER LAND?

Sound is composed of waves of different lengths transmitted through the air, and these waves can be interrupted and broken up by coming in contact with any obstacle, as the waves of water are broken up when they strike a rock. Now, on the land sound waves cannot travel very far without striking against houses, or trees, or mountains, or other obstacles to their progress, and these prevent the sound traveling to a great distance. On the sea, however, or on a great lake where the surface is perfectly level, it is possible to hear for a very long distance, simply because there is no hindrance to the path taken by the sound.

WHY DO FISH DIE, ALTHOUGH KEPT IN A JAR OF WATER?

We are all apt to imagine that all that is necessary for the life of a fish is that it should be in water, but, as a matter of fact, this is not true. It is not the water which keeps the fish alive, but the oxygen in the water, without which no animal, fish or man can live long. The only reason why fish can live in water better than other animals is that they have a special arrangement in their gills by means of which they can extract this gas from the water better than other animals can. But when a fish is placed in a jar of water it soon uses up all the oxygen that is in it, and when that is the case life is no longer possible. The fish, in fact, is drowned, just as much as a man would be, because he could not breathe under the water, man being able to extract oxygen only from the atmosphere. This is the reason why, if we keep fish in captivity, we have to change the water often in order to supply fresh oxygen.

WHY DO WE SWING OUR ARMS WHEN WE WALK?

It is rather difficult to say exactly why we swing our arms when walking, but there is no doubt that it is much easier to walk in comfort if the arms are allowed to swing naturally than if they are held stiffly by the sides of the body. Probably, therefore, the swing of the arms assists us in unconsciously keeping accurate balance as we move along, first on one foot and then on the other. Perhaps, too, it may be partly a relic of the time when primitive animals used their arms as well as their legs in walking, as a chimpanzee will do. In any case, the fact that it is so much more comfortable to walk swinging the arms seems to suggest that Nature may have intended the swinging to help us in accurate movement.

ARE WE TALLER IN THE MORNING THAN AT NIGHT?

The difference between our height in the morning and at night must be very slight; but if we assume that we are a little taller in the morning the explanation is to be found in understanding exactly how our backbone is made. The backbone consists of a number of bones, or vertebræ, and between each bone there is a disk made of cartilage. The object of this disk is to lessen the shock that would otherwise be felt on moving. Now, after being in an upright position for many hours, it is possible that the weight of the body squeezes

these disks somewhat and makes them a little flatter, so that the total height is slightly reduced. During the night we must suppose that they resume their natural thickness by elasticity, and so stretch the backbone to its full length. In that way we may be a little taller in the morning than we are at night.

WHY ARE BOYS STRONGER THAN GIRLS?

The explanation of the fact that the male sex is generally physically stronger than the female sex is to be found in the ancient history of mankind. In the early days men were generally hunters and warriors, and life was only possible as the result of a severe struggle. After many generations of this it came about that male animals as well as human beings became physically stronger, as the duties of the home and the care of the young generally devolved upon the females.

WHAT GIVES US "PINS AND NEEDLES"?

The curious sensation known as pins and needles is caused by continued pressure upon one or other of the nerves, and this is often the result of sitting or sleeping in an uncomfortable or cramped position. The actual cause of the peculiar feeling in the ends of the nerves is not exactly understood.

HOW IS IT THAT SOME ANIMALS CAN DO WITHOUT FOOD FOR A VERY LONG TIME?

A very good example of this process is to be seen in our common snakes, which, after feeding heartily during the summer months, retire into their winter quarters, where they take no food at all. The reason that they are able to do this is because during the months of activity, when they were feeding, they were enabled to store up in the body a large quantity of fat, which represents the excess of the food taken, over what was required at the time. Now, this fat can be used by the body itself while the animal is not actually eating. It is gradually absorbed, or used up. So we find that a snake which, at the end of the summer, was round and fat is extremely thin when it comes out of its winter quarters in the early spring. Many animals have this property of storing up food in the shape of fat in a greater or less degree; indeed, if it were not for this they could not live through the periods when there is very little food to be got.

WHY DO OUR FEET NOT WEAR AWAY AS OUR BOOTS AND SHOES DO?

There is a very remarkable difference between living things and dead things. Boots and shoes are composed of dead tissues which have no further power of growth, and therefore cannot replace those parts of them that are worn out by friction. Our feet, however, are made of living tissues, and the effect of friction and use, when applied to living things, is to cause these tissues to increase in size instead of wearing away. Indeed, if living tissues are not exercised they will not grow properly. In a single sentence the answer to this question is: boots and shoes wear out because they are dead; our feet grow because they are alive.

WHERE DOES THE TADPOLE'S TAIL GO TO?

At a certain stage in the life-history of a tadpole some of the cells within the tadpole's body begin to attack and devour the cells that make up the tail. The tail is gradually eaten away and absorbed until finally, by the action of these cells, there is nothing of it left. The material thus disappears, by the process which is known as absorption; it is "used up" by something else.

HAS THE AMŒBA GOT EYES, AND CAN IT SEE?

The amœba is a very minute living organism composed of one single cell of jelly-like material. It has no special structure at all, and it has therefore neither eyes nor any other special organs of sensation; but although it cannot see in the ordinary sense of the word, this is no drawback, because every part of the amœba's body is capable of performing all the functions necessary to its life. All creatures which are able to do this are said to be generalized, in contrast to those higher animals in which special parts are set apart for different uses, such creatures being termed specialized.

WHAT MAKES SOME PEOPLE DUMB?

As a rule the cause of dumbness has nothing to do with the vocal chords at all, which are always present and apparently normal, but for some reason or other in these people who are dumb the vocal chords cannot be used. That is to say, although the brain may produce an idea, and the person may wish to speak, something has happened which prevents

the message being sent from the brain to the vocal chords, and so there is no speech. So that we may say that any disease or injury which destroys that part of the brain called the "speech centre," or any disease or injury to the nerve fibres which pass from the speech centres to the vocal chords, will cause dumbness. Dumbness is sometimes present from birth, owing to some defect in development; at other times it comes on suddenly in after life. Sometimes it is permanent, at other times it only lasts for a short period and the person may recover the power of speech.

WHY DO LOUD NOISES MAKE US DEAF FOR A WHILE?

This is partly because a very loud noise makes such a very strong and powerful impression at the time that no other impression of the nature of a sound can be appreciated until the first one has disappeared. It is just the same with other sensations. We cannot feel more than one very intense sensation at once, and the attention of the mind is given to the most powerful. The deafness following a loud noise, or a box on the ears, is also partly due to the changes in the position of the drum of the ear and the delicate internal parts which take a little while to return to their natural position, because until they do this no other sounds can be properly appreciated.

WHY CAN'T WE REMEMBER WHAT HAPPENED TO US WHEN WE WERE BABIES?

There are many faculties of the mind which we only possess as our brain grows older and gets more exercise, and memory is one of these. We can only remember things by exercising that part of the brain which has to do with memory, and when we are still babies there has not been time for that faculty to develop, although it grows much earlier in some children than in others. Besides this, the things happening to us when we are babies are all of much the same degree of importance to us; we do not yet understand what are the big things in our life, and what are not; and so one thing makes about as much impression upon us as another. Now, memory depends largely upon the impression made at the time of the incident; and it is only when the mind is sufficiently developed to judge of the importance of things that memory becomes a well-marked faculty.

WHY DO WE FORGET SOME THINGS AND REMEMBER OTHERS?

Memory depends very largely on the impression made upon us by various incidents. The things we forget most easily are the things which do not strike us as being of much interest or importance when they occur. They readily escape our attention, and therefore are not impressed upon our memory. On the other hand, those things which appear to ourselves as great events in our lives—though they may not appear important to others—are firmly fixed in our memories, and always remembered, and it is for this reason that many trifling things are never forgotten. They did not appear to us trifling at the time, but made a deep impression.

WHY DOES THE CHAMELEON CHANGE ITS COLOR?

The object of the change of color of the skin of the chameleon is to enable it to become like its surroundings at the time, and so aid it in concealing itself. This capacity the chameleon shares with many other lizards, and they are able to change because they possess within the skin a great number of small cells closely packed together, filled with small granules. This causes a white color by reflecting light. Other cells are full of oil drops and appear yellow; others contain brown or reddish pigment, and the changes in color are brought about by contraction of different parts of the skin, and the movement of the different pigments. Thus, when all the pigment is forced towards the surface the animal looks quite dark. When the pigment is not so near the surface the color is changed to green, and where there is no pigment the skin appears yellow. The mechanism which causes these changes appears to be under the control of the will of the chameleon, but, in addition, the external surroundings, such as heat and cold, also cause some changes in the color.

WHEN A DONKEY EATS A THISTLE, WHY DO NOT THE THORNS HURT HIM?

If you will take the trouble to look carefully into the mouths of different kinds of animals, you will find that the inside of the mouth differs very widely in different species, according to the kind of food the animal lives upon. For instance, in your own mouth you will find that the lining of the mouth is

quite soft and easily injured, whereas in some other animals the membrane which lines the mouth is extremely tough and covered with thick scales, which enable the creature to crush foods which would injure a tender mouth. This is the case to a certain extent in cattle and in all animals which feed upon hard kinds of grass, and the donkey's mouth is another example of the same kind of thing. We may say, if we like, that the donkey eats thistles because he is an ass.

WHY DOES VACCINATION KEEP US FROM HAVING SMALL-POX?

There are some diseases from which a person never suffers twice, because the first attack makes the sufferer immune, or proof against a second attack of the particular microbes that cause this illness. Small-pox is one of the diseases against which we can be so protected. But many years ago a famous man named Jenner discovered that it was not necessary to have the actual disease in order to become protected, but that it was sufficient to produce a very slight illness by vaccination. The effect of this was found to be such that people who were properly vaccinated were quite free from the infection of small-pox for some years, generally five years at least. After that the effect is apt to wear off; and so in some countries it is the custom to be vaccinated every five years.

WHY DOES MUSTARD BURN OUR TONGUE?

There are a number of chemical substances which, when applied to the skin or the tender parts of the body, cause us to feel a sensation of burning; and mustard is one of them. It acts upon the tongue or other sensitive parts as an irritant, causing the blood-vessels in the part to swell up and discharge some of their contents. If sufficient be applied this will form a blister. This is what happens in the case of a mustard plaster, where, after the mustard has been in contact with the skin for a little while, we find that a red patch is produced by the swelling of the blood-vessels. This causes pressure upon the nerves, and irritation of the endings of the nerves, with the result that there is a sensation which we describe as burning. Quite a number of other substances besides mustard have exactly the same effect.

WHAT MAKES A WATER-SPOUT?

Just as the waves of the sea are due to movements of the air, so the very astonishing disturbance of the sea called a water-spout is also due to an unusual disturbance of the air. Sometimes parts of the air are started in a twisting motion, rushing through the air and at the same time turning round and round very quickly, somewhat as the earth rushes through space and turns round all the time. When this happens the sea may be very violently disturbed; and sometimes in the middle of this twisting portion of air there is very little air indeed—it is almost like a hollow twisting column of air. Then the water just beneath may be suddenly sucked up so as to fill the almost empty space inside this twisting column of air, and that makes a water-spout.

WHY DOES A FALLING OBJECT TURN ROUND?

The answer to this is that a falling thing turns round only if a turning motion was imparted to it when it began to fall. If we dropped a ball in such a perfectly even way that every part of it was let go at exactly the same moment—though this is by no means an easy thing to do—then it would not turn round as it fell.

But it happens that almost always, when anything is let fall, it is not let go quite evenly, and so a turning motion is given to it, just as it is given to a rifle bullet, and it goes on turning. Even when this does not happen, an object may be so shaped that one part of it offers more resistance to the air than another. That part will be retarded as the object falls, and so it will acquire a turning motion. This turning affects the flight of anything through the air, and if it be a ball affects it the way it bounces. So that in hitting a tennis-ball, or bowling a cricket-ball, we try to "put a twist on it," and this may make it swerve in a curious line as it twists while proceeding against the pressure of the air.

WHERE DO JUMPING BEANS COME FROM?

The jumping beans come from Mexico. It is not the bean that jumps, but a little insect inside it. A tree grows in the Mexican swamps near Alamos which has a curious fruit, three-cornered in shape, and divided into three parts, like little

pods. In two of these pods are small black seeds; the third part contains a tiny worm, and is what we call the jumping bean. Before the tree can have its fruit, it must of course, bear flowers. A little insect visits those flowers, and in part of each deposits an egg. The part of the flower which contains the egg grows with the rest of the flower, but, instead of becoming a pod for the seed of the tree, it turns into a home for the insect, which is in due course to be hatched from the egg.

Later, the flowers lose their petals, and seed-pods form and ripen. In August the seed is ripe. The husk containing the pods of seed and the little pod with the worm inside drops to the ground and splits into three parts—two of seed and the other that we call the jumping bean. Now, the insect has inherited the knowledge that if the bean lies where it falls it will be trodden upon, perhaps eaten by an enemy. So the worm coils itself up, then lets itself go suddenly, like a catapult, and carries its house with it.

It keeps on jumping until the bean is away from the tree on which it grew. In cold weather the little insect lies still and sleeps. As soon as the weather becomes warm, it revives and starts jumping afresh. If a little hole is made in the bean, the worm spins a web and fills up the hole.

The jumping bean is not the only growth in which insects make their homes. Cherry galls on oak-trees, or oak-apples, as most of us call them, are the homes of insects. A little gall-fly pierces a hole in a twig of the tree and in it lays one egg or more. Either the irritation from the wound in the twig or the action of the egg itself causes the twig to form a growth round the egg, hard and smooth. It is quite a pretty little growth, but inside there is one or more insects. The egg hatches, and a grub appears. It eats the inside of the oak-apple, and then may bore its way out into the world, or it may wait until it has changed into a perfect insect, and then come out. There are scores of sorts of gall-flies, but children will not like any so much as the little worm in the famous jumping bean.

WHAT IS MEANT BY STANDARD RAILWAY GAUGE?

The "gauge" of a railway is the distance between the steel tracks, on which the trains run.

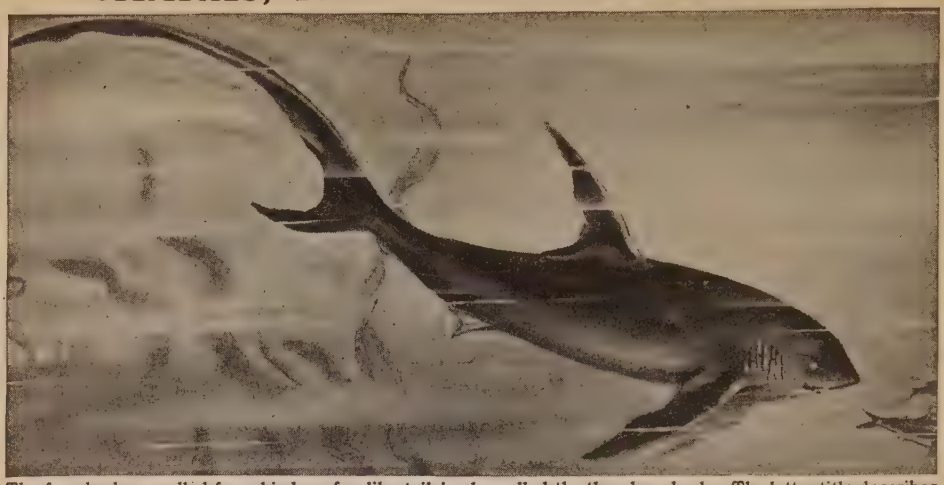
In the early days of railroading, some companies used a narrow gauge, and some a broad one, but this was found to be so inconvenient that a standard gauge of four feet, eight and a half inches was adopted. By this means, passenger cars and freight can be sent from one end of a country to the other without being reloaded, and much expense is saved. The origin of the dimension is rather obscure, but it is said that while George Stephenson was inspecting portions of the old Roman wall, in the north of England, upon which chariots were driven, he measured the width between the ruts worn by the chariot wheels in the stone. As he found this to be four feet eight and one-half inches across, he decided that the Romans must have learned from experience that this width was the most practical and adopted it.

WHAT IS THE GOOD OF HAVING TWO EYES?

We may say that perhaps it is not worth while having two eyes, since we seem to see just as well with one as with two. But sometimes we may have noticed that we or other people, in pouring milk or putting a lump of sugar into a tea-cup, have made a mistake, and have put the milk and sugar in the saucer. That is what is very likely to happen to anyone who uses only one eye. The two eyes do not look at anything from exactly the same place, but from rather different "points of view," as we say. The brain takes these two "points of view" and sees from both of them together; so that it is very much helped in judging of the distance of things by the difference between the two images of it seen by the two eyes. It is because we have two eyes that we see things in their relation in front of or behind each other. An ordinary photograph looks flat, because, so to say, the camera only saw it with one eye. But if we take two photographs of a thing, from two points of view corresponding to the distance between the two eyes, and then put the two photographs side by side at the right distance, and look at them with both eyes through the simple little instrument called a stereoscope, or "solid see-er," then we see the view as if it were solid, or see it "in relief," as people say. We see it as we should have seen the thing itself if we had looked at it with our own two eyes.

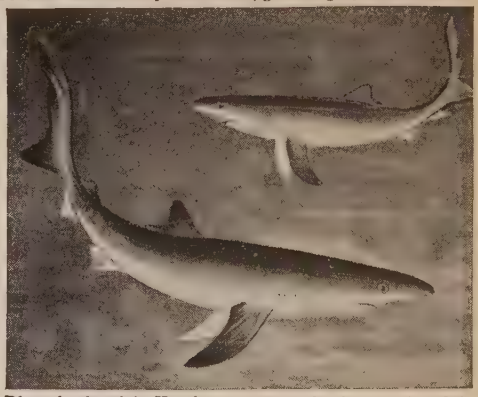
THE NEXT QUESTIONS BEGIN ON PAGE 2535.

SHARKS, THE WOLVES OF THE SEA

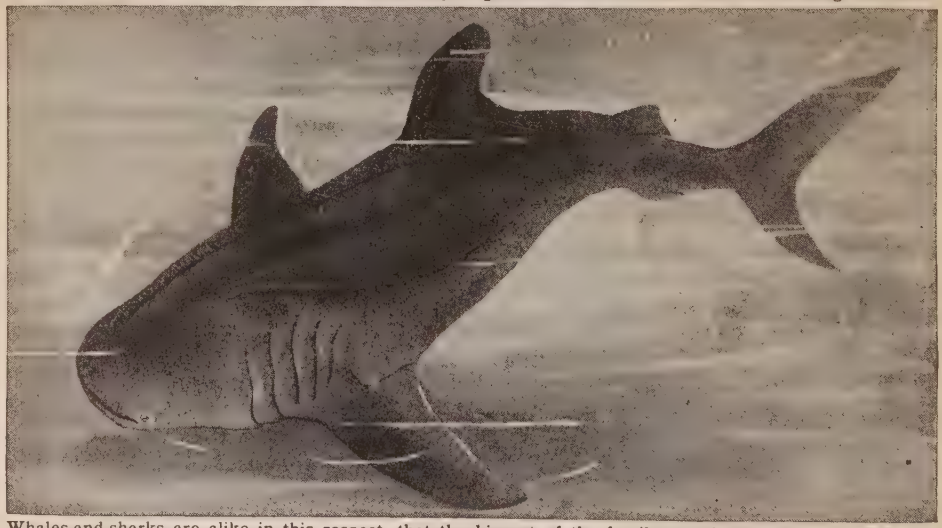


The fox shark, so called from his long fox-like tail, is also called the thresher shark. The latter title describes his methods. Swimming round a shoal of herrings or mackerel, he "threshes" the water with his big tail, frightening the fish close together. Then he darts in and has a very fine meal, gobbling up all he wants.

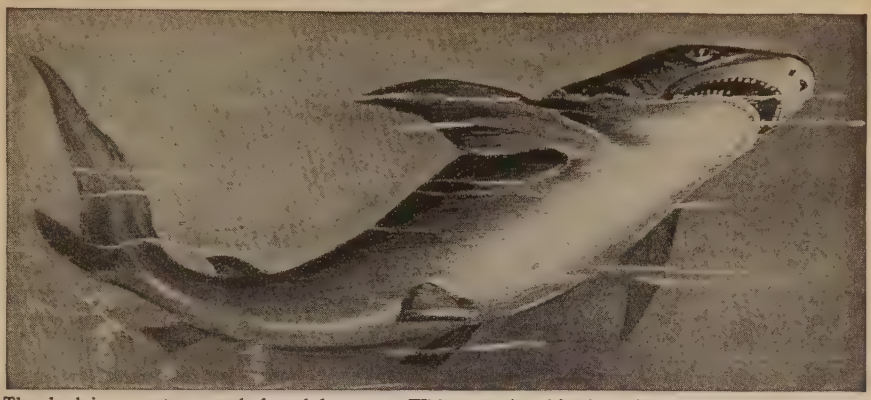
The hammer-head shark is the most curious specimen of the family, and as much feared by men as any.



Blue sharks visit Northern waters, chasing smaller fish right into the fishermen's nets and ruining the latter.



Whales and sharks are alike in this respect, that the biggest of the family are the most peaceful. The big basking sharks are content to take in huge mouthfuls of small fish and to let the rest of animal creation go.



The shark is a creature much feared by men. With one snap of its jaws it can bite a man in halves. The terror of shipwrecked sailors, it is dreaded by all bathers in warm seas and tidal rivers.

BIG FISH OF SEA AND RIVER

CONTINUED FROM 2412

NOW that we come to the fishes proper we have a very big subject. There are fully 9,000 different species of fish in the waters of the world to-day, and in the rocks men have found remains of a thousand more species of fishes that once lived, but have left no descendants like them. If we took the scientific order of classifying fish it would be terribly dull work. All the scientific words are difficult for us to remember, and unnecessary to use at this stage of our study, so we must just learn to know a little more about the fishes themselves, and leave all the technical matter about their scientific classification to later and more serious reading and study.

Naturally, in thinking of the big fishes of the sea our thoughts go first to the sharks. A big hungry shark is the last thing that we should desire to meet in the water. With their frightful teeth they can bite a man in two. Yet even death in that form might be less terrible than by the methods employed by the horrible saw-fish. That cruel wretch really ought to come into this chapter, but we have already seen, on page 1072, what a ferocious creature he is, as well as that other rogue, the sword-fish, and what terrible enemies they are to the mighty whale, so we need add nothing here.

The sharks, big and little, are quite bad enough for one story. Some of them, like the huge basking shark, will not attack a man unless first attacked by him. These have only small teeth, in spite of their enormous bodies, and lie lazily on the top of the water, content with small fishes that swim in shoals, and even tinier things with no backbone. The basking shark grows to a length of more than thirty feet, and has a huge mouth to enable it, like the baleen whale, to take in a great quantity of food at one gulp. Men hunt it for the sake of its oil, of which a large shark yields from a ton to a ton and a half.

The shark of which we have most reason to be afraid is the white shark. The members of this species reach a size which is exceeded only by that of the great whales. One has been preserved which measured 37 feet, but that is by no means the largest of which there is record. Still, that is big enough to do frightful harm to men. These sharks have terrible teeth, set in rows, one row behind another. As the teeth wear out, or become dislodged, they are replaced by others, as in the case of the snake. The sharks have this feature, too, in common with the snake, and all other fishes too, that they do not propel themselves through the water by means of the tail.

Like the eels, they make their way by a wriggling of the whole body, and their great fins serve as balance, as in the case of the rest of the fish family.

The mouth of the shark, as we all know, is placed underneath its body, so that to grasp its prey it has to turn over on its side. This is the one chance which a man in the water has against these monsters. If he has a knife and can swim, he may save himself by diving as the great fish turns, and by stabbing it with his knife. But not every man has the power and the nerve for such a feat.

Very determined creatures are the big sharks; they will follow a sailing-ship for weeks, showing a wonderful power of muscle. Many sailors have a superstition that when a shark follows a vessel it is a sign that somebody on board is going to die. Of course that is all nonsense. Sharks follow vessels because experience has taught them that all manner of garbage, good enough to make a shark a meal, is thrown overboard. If by some dreadful misfortune a man should fall overboard, then woe betide him. The shark will have him, or will, at any rate, snap off one of his limbs.

SHARKS THAT FOLLOW THE HERRINGS INTO THE FISHERMEN'S NETS

We do not often see white sharks off our coasts, a fact for which we have reason to be thankful. But their relatives, blue sharks, visit us. They come after the herring, mackerel, pilchards, and other fish, and follow them into the nets. They have no fear of the nets spread to catch smaller fish. With their sharp teeth they can bite the nets to pieces, while, if there be bait on a line, they cut the line through as easily as if it were made of cotton. They make sad havoc with the fishermen's nets and lines. In the summer of 1916 several swimmers were killed by man-eating sharks on the coast of New Jersey. One shark swam two miles up the shallow Matawan Creek and there killed two people. A number of the sharks were caught and killed. In warm seas the blue shark reaches a length of 20 feet and even more in some cases, and will attack a man as readily as will a white shark.

Another enemy of the fishermen is the fox, or thresher, shark, which has a singularly long tail, of which the upper lobe grows to such a size as to suggest the first name it bears. The second name, that of thresher shark, is suggested by its habits. It swims round and round a shoal of herring or mackerel, and by threshing or beating its big tail on the water frightens them all into a mass, where it can dash in and eat as many as it wants. Nineteen big mackerel and two herrings were taken from the stomach of one of these sharks which was caught.

AN ENEMY OF THE WHALE, AND THE SHARK WITH THE HAMMER-HEAD

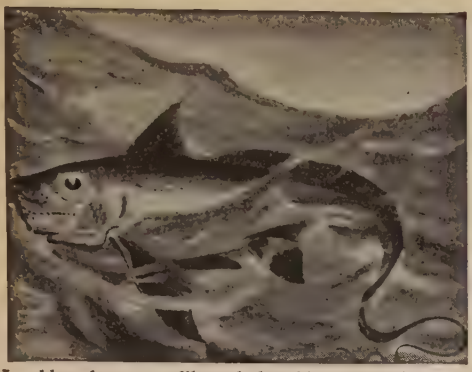
Another of the hungry sharks is the Greenland shark, which reaches a length of 26 feet, and sadly persecutes the whale. With its powerful teeth it can bite huge lumps out of its larger neighbour's tail; and it is so eager to gorge itself with food that it will allow men to approach and spear it while feeding on the body of a dead whale. Perhaps the strangest of all the family is the hammer-headed shark. This has a remarkable head, as its name implies. The front portion of the head grows out into two broad lobes, the eyes being placed at the ends of the two lobes. What purpose this formation serves nobody knows. The mouth is underneath in the usual position, and the brute is as much dreaded by men as the rest of the genus.

To discuss all the different kinds of sharks would be to fill this book. Some in the Indo-Pacific are said to attain a length of 70 feet; others are like great savage conger-eels; others are remarkable for the formation of their jaws, which have the teeth arranged like spiky pavements.

GIANT TEETH THAT TELL US OF SHARKS OF BYGONE DAYS

Between the coasts of Australia and Japan sharks hide in waiting for their prey, clad in skin which looks like rock covered with short vegetation and coral. Many species of sharks have died out, and we are able to trace them only by their teeth. Their bones, as we should call them, disappear. The framework of the sharks is not really bone; it is tough, fibrous cartilage, which in course of time disappears from the skeleton, leaving only the teeth to tell us where the sharks were. Great quantities of these teeth have been found in the rocks of certain parts of Europe, while in Florida they were so numerous that the

FISHES THAT BREATHE LIKE ANIMALS



In olden days men likened the chimera to a hideous monster with a lion's head and goat's body, which breathed fire. Now we call it the king of the herrings.

The Australian lung-fish can breathe under water through its gills, but frequently has to raise its head above the water to fill its lungs with air.

We all recognize the dog-fish and call them by that name. They are really small sharks, the only sharks that live off Northern coasts. To the left we have the lesser spotted dog-fish. On the right are two spiny dog-fish. Near the lesser dog-fish we see the pouches, anchored to seaweed, in which its eggs are laid.

Australia has not all the lung-fishes. Here we have, on the left, the African mud-fish, and, on the right, the South American mud-fish. They both possess lungs, and frequently rise to the top of the water to take deep draughts of the air that we breathe. The African fish sleeps in the mud when his river dries up.

rocks used to be quarried in order that the fossil teeth might be sent to England to be ground up for artificial manure. Some of the fossil teeth are five inches long and four inches thick at the roots.

THE GREAT SHOALS OF LITTLE SHARKS THAT WE CALL DOG-FISH

The shark still comes into the market. His skin is spiny, and we call it *shagreen*. It serves for purses and other things, while the cabinetmaker and other workers in fine wood use it as a better sort of sandpaper. To the Chinese the fins of the white shark are precious for soup. The fins are mainly composed of gelatine, and thousands are imported into China every year. That suggests that many sharks must be caught. And that is true. The number caught every year is about 100,000.

This number does not include the dog-fishes. There are millions and millions of those in our own waters. We rarely fish in the sea without pulling up dog-fish. They are sharks just as much as the hammer-head and white shark are, only they are smaller. They have the rough, spiny skin of the true shark, and very valuable it is. Their bodies contain a useful oil, and their flesh is good for food. We knew this years and years ago, but the fish fell into disfavor, mainly because of its name. So nobody but the poorest of the poor would eat it. It was thrown away, or at least it was supposed to be.

But in England large numbers of dog-fish were secretly taken inland, skinned, and sold as another sort of fish, and nobody was the wiser but the fishermen and the dishonest shopkeepers.

THIRTY MILES OF SMALL SHARKS, AND THE BABY SHARK'S CRADLE ON THE BEACH

Lately, people have recognized that the so-called dog-fish is good for food and thousands are being caught and sold. The dog-fish eat herrings, sprats, and other small fish, and simply teem round the coast. They fill the fishermen's nets; they swarm upon his lines. Once 20,000 were taken in a single boat's haul, and a shoal of them was seen—an unbroken mass, twenty or thirty miles broad. No wonder that when shoals like this invade the fishing-stations the fishermen have sometimes to suspend their operations.

The dog-fish are true sharks in the way they deposit their eggs. These appear in tough pouches, which we find on the seashore, and call mermaids' purses, sailors' purses, or sea-purses. From the corners of the purses little tendrils extend. By these the pouch of eggs is anchored to seaweed, and the mother fish hovers round to see that no harm befalls. Those that we find contain, as a rule, no eggs, but are simply the empty cases from which the baby shark has disappeared.

A near ally of the sharks is a singular fish called the chimera. It is the only fish which, as far as we know, produces eggs which imitate their surroundings. These are oval in shape, and bordered with a fringe, so that the egg-case floats about like a piece of seaweed until the little fish is ready to emerge.

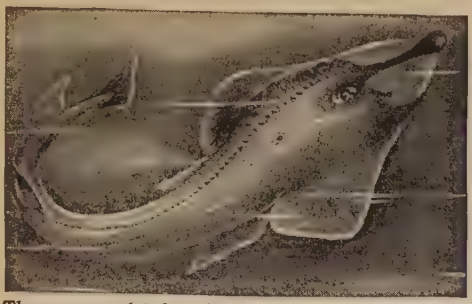
THE HIDEOUS CHIMERA AND ITS EXTRAORDINARY COUSINS IN THE RIVERS

The chimera is one of the ugliest fishes, and has fallen low in the scale of life. It is a higher form than the shark, from which it is descended, but now it reaches only five feet in length, whereas in the old days there were giant chimeras. Those who named the fish likened it to a mythical monster called the chimera, which, they thought, had the head of a lion, the body of a goat, and the tail of a dragon, from whose nostrils fire issued. Modern sailors have called it the king of the herrings, because of its habit of feeding upon those fish.

Not only is this fish related to the shark; it is related also to the lung-fishes. These in themselves resemble, to a small degree, the sharks, though there is so little in common between them that they are placed in different classes. The lung-fishes, as their name suggests, breathe by the aid of lungs, which means, of course, that they must rise to the surface of the water and draw their supply from the atmosphere. There are three known sorts. There is the great six-feet lung-fish of the Australian rivers, there is the mud-fish of the South American rivers and swamps, and there is the African mud-fish.

The Australian species can obtain air under water by means of gills, but they have to rise now and then to the top to breathe. The American and African species are not so fortunate, but must rise frequently to the surface of the

FISHES THAT CARRY ELECTRICITY



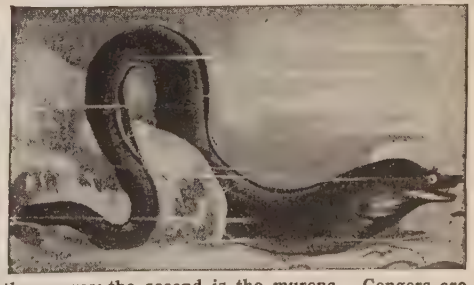
The rays are related to the sharks and to the skates. Here we have the halavi ray on the left, and the Indian ray on the right. They live at the bottom of the sea, and catch their prey by cunning, not speed.

The thorn-back skate is heavily armored on the back, and sometimes on the sides of the head, with claw-like spines. The males have sharp pointed teeth, but the females' teeth are blunt and flattened.

Here we are shown the common skate and also, close by, the famous marbled electric ray, which gives forth electric shocks exactly like what we should get from a very powerful electric battery.

The electric eel is not an eel at all, but is related to the cat-fish and the carp. Its electric shocks may kill its prey, or stun a man and make him ill.

The ribbon-fish is very long, but very thin. It lives far away down in the deep sea, and is only seen on the surface of the water in a dead or dying condition.



Two famous eels now wait to be seen. The first is the conger; the second is the murena. Congers are abundant in most seas. They form excellent food for man, and we must think well of them because they destroy the horrid cuttle-fish. The murena is a sea-eel, six or eight feet long, with big sharp teeth. It savagely attacks men in or out of the water. It is beautifully colored and spotted and looks like a snake.

water to take in air. The South African mud-fish must be considered in advance of his fellows, for when the rivers in which he has his home dry up, he makes himself a sort of nest in the mud, and goes to sleep, caring for nobody. When the waters refill the river channel, he revives, and sets to work to eat and get fat again, like a bear which has been sleeping away the winter.

FISH THAT TRAVELED ACROSS THE WORLD ALIVE IN CLODS OF MUD

A peculiar feature of these strange fishes is their teeth. These make its mouth a great grinding mill. The teeth are shaped like the antlers of deers, and they fit together, so that shell-fish of quite large size can be easily crushed. When they are out and about the lung-fishes need much food. Their fasts are long. Some of them were dug up from the mud and sent in their clods to Europe. There they were put into a big tank in a hothouse, and revived at once, and began to eat the snails, worms, and small fish thrown to them. When these supplies ended they calmly set to work to eat each other.

The appetite of the lung-fishes must not surprize us. All sea-fishes are hungry creatures. The deeper we go, the more hungry we find them. Their food has mostly to come from the sea above them, and as many fishes are on the look-out at all depths, there is a chance that those in the lowest levels may often have to fast. Hence they have developed an elastic stomach which can extend in the most marvelous way when food does come, like that of the great snakes on land.

THE UGLY RAYS AND SKATES THAT STEAL ALONG THE BOTTOM OF THE SEA

In one, only four inches long, there was found another fish seven and a half inches long, curled up like a ball in the other's inside. Another—a six-feet creature—called the Plagyodus foxus, was found to contain several cuttle-fish, many shell-fish and sea-squirts, twelve young boar-fish, a horse-mackerel, and one of its own species.

Passing now to other members of the shark family, we come to the rays and skates. These are ugly, sluggish things, which move stealthily at the bottom of the sea. They use the tail as a rudder, and swim by gently moving their fins. Every aquarium has some of these fishes. As they cannot swim quickly, they have to depend largely upon low forms of fish-life, such as backboneless creatures and shell-fish, for their food. But they are colored so nearly like the mud over which they move that at times they deceive bigger fish into approaching. The ray cannot grasp its big prey as other fish can, for its mouth is below; so it darts over it, holds it down by weight, and then grabs it with its mouth.

The skate is common enough in our fish-market, and, though it is not delicate fare, poor people are glad enough to eat it, taking care not to swallow the sharp spines with which its back is armed. We have seen an egg of the skate on page 1420. They much resemble those of the dog-fish, but instead of streaming tendrils at the four ends, they have short ends like handles, to what appears a small, inflated stretcher. Skates reach a length of from two to four feet, but one has been caught which weighed as much as 90 pounds.

THE FISH THAT CAN STUN A MAN WITH AN ELECTRIC SHOCK

The most remarkable member of the ray family is the electric ray, or torpedo. Like the electric eel, it has all the properties of an electric battery. By some marvelous means it has produced electric cells from the muscles of its body, which enable it to stun and kill a fish, and paralyse a man's arm if he completes the circuit by touching it with two hands. The electricity from these fish will decompose water, just as the electric spark set up by the man of whom we read in the story of the men who found electricity, told on page 2161. It can decompose chemical compounds and actually produce a spark. The strength of the shock it gives is sufficient to make a man quite ill for days. How their power works against other fishes may be judged from the fact that an electric ray has been found to contain a two-pound eel and a one-pound flounder, while another had a four-pound salmon in its stomach.

Bad as is the electric ray, the shocks which it can communicate do not compare with those of that terror of certain South American rivers, the electric eel. The nerves of the electric organ in the electric skate arise in the brain; in the electric eel they come from the spinal

cord, and over two hundred such nerves have been counted. Their power is amazing. An old story is told in very many books that, when the natives of Brazil want to catch these fish, they drive horses into the rivers, which are attacked so fiercely by the eels that the latter lose their power, and may then be handled with safety. Some of the horses, it is said, are killed by the shocks.

Fifty kinds of fish that store up electric energy

Happily, there seems to be no foundation for the tale. But that the eel does lose its power we know from careful experiments. It has a certain amount of energy stored up, and when this is first tapped, it can give so serious a shock that several persons holding hands feel it. When this power is exhausted the eel must rest before it can give further serious shocks.

Quite fifty different kinds of fish can give electric shocks, but the only serious trouble of this sort is that caused by the ray, the eel, and the malapterurus, or thunderer fish, of the Nile. Here the current comes from two enormous nerves, one on each side. Both the thunderer and the eel are more powerful than the skate, yet the latter can by a single discharge disable a full-grown man. We do not know where these strange creatures got this mysterious power from. The ancients knew of it, and used the electric discharges of the electric ray and eel for curing illness. Since 1772 the subject has been carefully studied by scientists, but though we know all about the structure in which the wonderful power resides, we are still no nearer to learning how it began.

The strange life-story of the mysterious eels

All the eels have been a source of mystery. For ages men could not understand them. They hide in the mud by day and come out to feed only at night, so they were difficult to study. But the mystery has now been solved. Eels are born at sea, and millions upon millions of them come up the rivers in the spring. Their numbers almost pass belief. It is believed that an eel of average size may produce at least five million eggs, while twenty million may be produced by a very large one. If the spring migration be large the young fish may pass in an unbroken line for weeks on their way up to the headwaters of a river.

Their habits are not like those of ordinary fish. They climb water-gates; they swarm over all sorts of obstructions; they climb the banks and make their way over wet fields and dewy grass to the place to which they wish to go. Those which come up the rivers are supposed to be mostly females. Nearly all the young males remain in the sea or at the mouths of the rivers. They live in fresh water perhaps eight or ten years. Then, when they are fully grown, they swim out of the lakes, down the rivers and out into the centre of the deep Atlantic where they lay their eggs and die. No eel ever comes back. They must have sea-water in which to spawn.

This is not the way the conger-eels live. They are the big people of the family, and always remain at sea. They live on cuttle-fish, octopuses, and so forth, and as they are bold and hungry they are terrible foemen. But they are not so much to be feared as the murena, the great sea-eel with huge teeth, which it uses without distinction upon man or fish.

The fighting conger-eel, and the strange ribbon-fish

The congers are bad enough. When pulled up on a fisherman's hook they fight in the boat with great strength, and will bite with the fury of a young bulldog. The sea-eels are clean feeders, but those which come up our rivers, not satisfied with small water animals and the eggs of other fish, delight in the flesh of dead bodies which may be floating in the water.

Many of us, seeing a ribbon-fish for the first time, might take it for an extraordinary form of eel. Its long, thin body does suggest that idea when only one view of it is seen, but upon a closer view we find that, though the whole body is from 15 to 20 feet in length and a foot in depth, the width is only an inch or thereabouts; hence the name ribbon-fish. It belongs to the spiny-finned group, and is related to that remarkable creature, the unicorn-fish, so called from its remarkable spine, which curves like a crest from the tip of the snout back over the head. This is only about a third of the length of the curiously-shaped ribbon-fish.

The ribbon-fish has been responsible, it is believed, for more than one story of the sea-serpent. Sir Richard Owen, who did not believe in the existence of sea-serpents, declared that one story of the supposed appearance of this monster lay in the fact that a ribbon-fish, sporting on the top of the waves, had been sighted. He may have been right. But it has since been discovered that the ribbon-fish, if seen on the top of the waves, must have been dead. It is one of the deep-sea creatures, and cannot exist near the surface of the waves.

Dead ribbon-fish, which have been discovered cast up on our shores, have been so utterly shattered, through the pressure of the water being withdrawn, that it has been impossible to take them from the sea, their flesh being utterly broken up. When young their flesh is so extremely thin and filmy that, if they did not live at the bottom of deep seas, where there is little movement of the water, they would be washed to pieces.

THE TERROR OF THE CUTTLE-FISH, WHICH CAN PULL DOWN A BOATFUL OF MEN

Whether there really is such a thing as a sea-serpent we do not know. For hundreds of years men have told of seeing such monsters, but there has generally been an explanation showing that a mistake has been made by onlookers. A couple of blue sharks floating with their fins high in the air have been proved to be what men mistook for a sea-serpent. A line of gamboling dolphins has misled other mariners. Then there can be no doubt that the enormous squids seen far out at sea have caused other errors.

There are many cuttle-fishes off our own coasts. A huge squid with arms 24 feet long has been caught off the Newfoundland shore. Giants of the family live in the Pacific and Indian Oceans, and are the most loathsome things in the sea.

So hideous and repulsive are they that men call them devil-fish. It is impossible to think of a more dreadful creature. Some have huge bodies 19 or 20 feet in length, with a powerful parrot-like beak and a cruel rasping tongue. They have eight or ten terrible arms. These arms in the biggest species are 40 or 50 feet in length. These are armed with suckers, and have claws like a tiger's. The octopus lurks in waiting for its prey. When this approaches, the terrible arms of the monster are shot out, the claws cling, the suckers make fast. Even a little cuttle-fish clings so fast to one's hand that its tentacles must be cut one by one to make it let go. But with a big one grappling no man could escape. They are said to be able to pull down a boat and all its crew with their fearful arms; and no wonder, when we read of their being able to engage in battle with the great toothed whale.

A FIGHT TO THE DEATH BETWEEN TWO OCEAN MONSTERS

Mr. Frank Bullen, who was for many years a sailor, and afterwards wrote some fine books, saw one of these terrible fights while he was at sea. The battle was between a fierce sperm whale and a giant squid. The arms of the monster were twined about the great whale's huge head. Might not these great writhing tentacles suggest a sea-serpent? Such a sight would make an unpractised observer believe that the fabled monster was actually before him.

The squid which Mr. Bullen watched had a head big enough to contain 350 gallons, and its eyes measured a foot in diameter. The whale won the battle; it was eating the cuttle-fish as Mr. Bullen watched. We may remember the story of three men who were painting the sides of a ship, while the vessel was becalmed at sea, being swept off the vessel by the arms of one of these dreadful creatures and drawn down into the sea. The sailors on board tried to save their unfortunate comrades, and cut off one of the creature's arms with a hatchet. It was as thick as one of the masts of the ship, and the suckers on it were as big as saucepan-lids.

THE CURIOUS INK-BAG WITH WHICH THE CUTTLE-FISH DEFENDS ITSELF

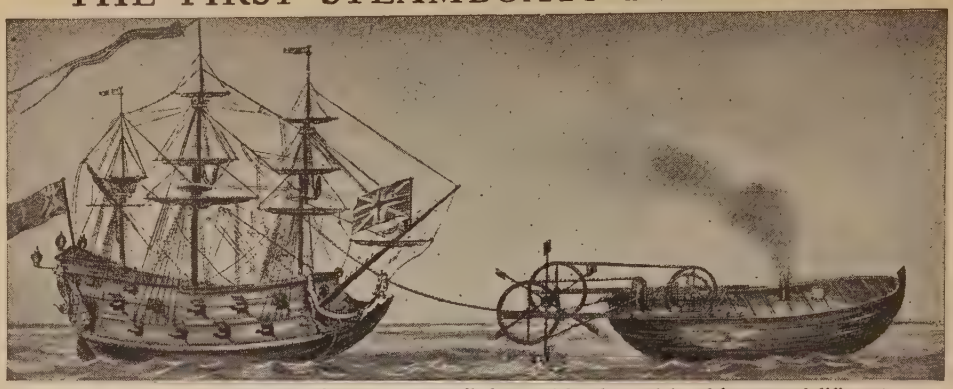
All cuttle-fish carry an ink-bag as a means of defence. If they are about to be attacked they squirt out this liquid, turning the water round about them quite black. The little cuttle-fish that are used as bait do this. They have in the midst of their bodies a little shell-like bone of chalky substance, which is often used in tooth-powder. The ink which the octopus carries is called sepia, and is used by artists.

THE NEXT STORY OF FISHES IS ON PAGE 2601.

THE LONG-ARMED GIANTS OF THE SEA

Of all the deep-sea monsters none horrify more than the great squids and octopuses. They are hungry creatures, and with their parrot-like beaks and their rasping tongues, which are like terrible files, they devour any living creature that they can master. With their fearful arms they cling like serpents. Their hold is sure, because each of the terrible arms has many suckers, which cling so tightly that a man, to escape, must cut himself free with a knife or axe. The squids and octopuses and small cuttle fish are all constructed on the same plan. Each carries a bag of ink, and when pursued squirts out the ink, so darkening the water and rendering escape easy. The ink which some octopuses carry is the sepia that we use in painting.

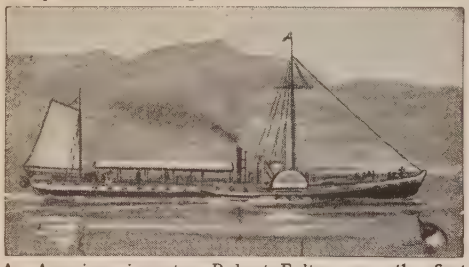
THE FIRST STEAMBOATS EVER MADE



Although the honor of building the first steam-propelled vessel has been claimed for several different men, yet it probably was an Englishman, named Jonathan Hulls, who built the first steamboat, in the year 1706. Here we see Hulls' own drawings of his vessel, which are still in existence in the patent office.

One of the very early steamboats was built by a Scotchman, William Symington, in 1788. It had two paddle-wheels right in the middle of the deck.

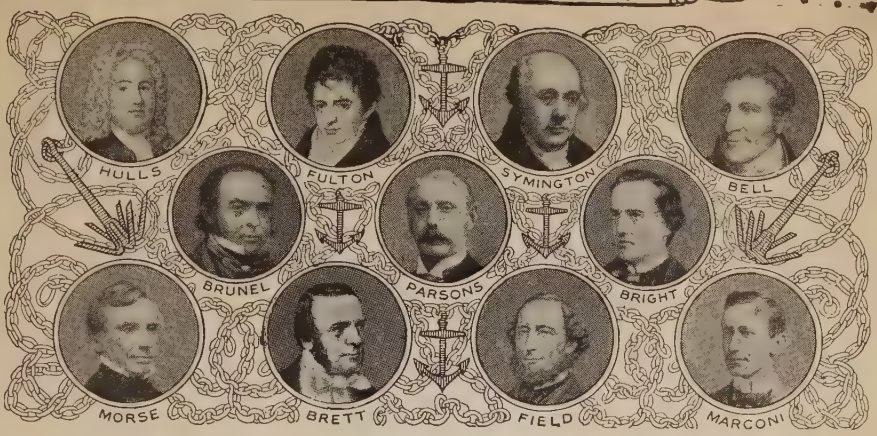
In 1803 Symington built a steamboat for Lord Dundas, and it towed barges on the Forth and Clyde Canal until its use was forbidden by the canal owners.



An American inventor, Robert Fulton, was the first to make steam navigation commercially successful, when in 1807 he built this steamboat on the Hudson.

Another success was by a Scotchman, Henry Bell, who built this ship, called the Comet, in 1812. It scared ignorant people, who thought it a monster.

Inventors were now busy improving the steamboat, and steamers began to be built everywhere. When steamboats appeared on the Thames, there was much opposition from the boatmen. By 1837, however, steamboats ran regularly from London to Margate, and here we see two steamers approaching Margate Pier.



CONQUERORS OF THE SEA

CONTINUED FROM 2444

IN reading the adventures of Robinson Crusoe we all feel thankful on coming to the part where he is saved from the sea. But when he settles down on his island, gloom at first comes upon us, for there he is in that desert spot, alone, surrounded by the sea. It is a dreadful position for a human being, so lonely, so hopeless. Well, suppose there were no ships, no balloons, and no aeroplanes, the inhabitants of Great Britain, for example, would be forty million Crusoes. They could not send letters to their friends abroad. Their Colonies would be of no use to them, for there would be no means of sending settlers to them; nor, if the people were already there, of exchanging goods or messages with them. "There would be the telegraph for communication, would there not?" asks someone. But if we had no ships we should have no telegraph across the seas, for we should never have been able to lay the cables.

With no ships and no telegrams the sea would be a source of horror to us. It would be a fearful void, shutting us out from communication with other parts of the world. And that is just what the sea was to men before they learned the art of shipbuilding and navigation. By a series of grand schemes men have changed all this. There was the gradual building of great ships; there was the making of accurate instruments by which men could tell at any moment of the day or night their exact position at sea, no matter how far they went; there was the application of steam to the purpose of the ship; and there was the laying of the ocean cables.

These things accomplished, the sea remained no longer an enemy. The ocean became a roadway, leading to all parts of the world. Storm and tempest, fogs and hidden rocks, still cause disaster, it is true, but the accidents are rare, considering the enormous number of ships there are. The sea has become one of our best friends.

And all this wonderful change in our affairs we owe to a very small number of men. It will be enough for our purpose if we glance briefly at the careers of the chief figures in these revolutions in the history of the world.

Every time that some great change has been proposed for the benefit of mankind, people with power and influence, who ought to have given their encouragement and support, have always been among the first to say: "It can't be done," and

"It shan't be done." That is just what happened concerning the steamship and the ocean telegraph. Take first the steamship. No invention ever had a harder struggle for life. Fate and men both seemed against it.

THE MAN WHO FIRST MADE A MACHINE DRIVE A BOAT THROUGH WATER

The Spaniards say that a countryman of theirs, named Blasco de Gary, who lived in the sixteenth century, made a model steamboat in 1543. But we have to be careful about believing stories of this sort without clear proof. It is almost quite certain that though the boat had paddle-wheels, they were not worked by steam.

A century later, Denis Papin, a famous Frenchman, appeared on the scene. He was a physician, born at Blois in 1647, and he died in England in 1712. A very talented man, he was associated with several of the famous men of whom we have read in the story of the men who found electricity, told elsewhere. Frenchmen declare that he invented the steam-engine and steam navigation, and in many books his name is given as having achieved that result. But that is wrong. He was a man of splendid brain, but his thoughts did not turn to the making of a true steam-engine as we know it. What he invented was an engine worked not really by expanding steam, but by atmospheric pressure. His idea was a brilliant one, and it led to great things in the hands of Newcomen, Brindley, and Smeaton. We must remember that it was not the true steam-engine; but as his engine, such as it was, was fitted to a model boat and drove the boat through the water, Papin well deserves his place in the gallery of heroes who brought about steam navigation.

TWO GREAT INVENTORS WHO WERE RUINED BY THE FRENCH REVOLUTION

Many names appear for a little time upon the page of the history of this invention. One of them, Jonathan Hulls, patented a sort of steamboat in England in 1736, but years were to pass before anything practical was done. More men crowded to the task, and we find several skilled inventors working in rivalry at the same time. One of these was the unfortunate Marquis de Jouffroy, who, born in France in 1751, set himself, at 26, the task of driving a boat by steam. He adopted Papin's idea, and in eight years made three successful boats. The first was 40 feet in length; but it was the third which is said to have been the first real steamboat. He might have gone on to complete success, but the French Revolution drove him, an exile from his country, to America. When he returned to France, he was too late; others had seized his ideas and begun to reap the honors which should have been his. He died in 1832.

At about this time two American engineers, named James Rumsey and John Fitch, were making experiments. Rumsey is of importance to us as being the man who first turned the attention of Robert Fulton to the subject. Fitch came into prominence in the American Revolution, acting as gunsmith in the Revolutionary army. His first model steamship was made in 1785. The next year he built another boat with paddle wheels, and in 1790 one of his boats carried passengers on the Delaware. He went to France just as Jouffroy was leaving, and, like Jouffroy, was ruined by the Revolution. It is said that while he was there his plans were shown to Fulton. Anyhow, he returned to America starving, and killed himself.

THE PAINTER OF PORTRAITS WHO BUILT A STEAMBOAT

It was for something quite different from shipbuilding that Robert Fulton went to England. He was a painter of portraits, born in Pennsylvania in 1765, but set out for England in 1786, in order that he might study this art under Sir Benjamin West. He became acquainted with Rumsey, who had also gone to England earlier, and, after discussing inventions with him, gave up all thought of painting. Fulton's brain teemed with ideas. He invented things for the improvement of canals, for cutting and polishing marble, for twisting rope, for iron bridges, for spinning flax, for dredging rivers, and for making boats go under water and blow up ships. But the great work of his life was done for the steamship.

In 1803 he built a steamship, but its engine was so heavy that it fell through the bottom of the vessel into the River Seine, in France, where he was trying it. He did not lose heart, but recovered the

HOW NAPOLEON LOST STEAM POWER

Fulton, the American, went to France and offered to build a steam navy for Napoleon. "Great man," said Fulton, "if you will support me, you can have the most powerful navy in the world." But French scientists told Napoleon that steam would not drive a toy. Napoleon was in Elba when he first saw a steamboat.

Fulton also invented for Napoleon a submarine boat, and, with three friends, he remained under water for one hour. This boat was to fire a torpedo, or, as Fulton called it, "a carcase of gunpowder." Nothing came of the invention, and here we see an amusing caricature of the submarine, published in America in 1811.

A great step forward was taken when men learned to drive a boat by a propeller at the end, instead of by paddle-wheels at the sides. Both methods had their supporters, and in 1845 there was a great test, resulting in a triumph for the propeller. Two steamships, the Rattler, the first warship with a propeller, and the Alecto, a paddle-boat, had a tug-of-war, as shown here, and the Rattler pulled the Alecto quite easily.

* Copyright by The Century Co.

engine and built it into a stronger boat. This he made to move, but it was too slow to be successful. Going back to England he prepared plans and had an engine built by Boulton and Watt, of whom we have read in another part of our book. Then he came to America and left the engine to be brought over, packed up in a ship. When it arrived, he set to work to put it together. His story, told in his own words, gives us an excellent idea of the hard lot of the inventor of those times.

ROBERT FULTON'S FIRST STEAMER, AND THE SCOFFING OF STUPID MEN

"When I was building my first steamer in New York," he wrote, "the work was viewed by the public either with carelessness or contempt, as a useless scheme. My friends, indeed, were civil, but they were shy. As I had occasion to pass daily to and from the building yard while my boat was in progress, I often loitered unknown near idle groups of strangers, and heard them scoff and sneer and ridicule. Never did a single encouraging remark, a bright hope, a warm wish, cross my path. My work was always spoken of as Fulton's Folly."

But at last the ship was built, and set out with passengers for a trial trip. The vessel moved off, went a little way, then stopped. Everybody except Fulton thought that this was the end—that he had failed, as they all had expected. But he went below and soon put right some trifling mishap, and the boat steamed away, while people were saying: "I told you it would be so; a foolish scheme; I wish we were safely out of it." The vessel went its way, a journey of 150 miles in 32 hours. Fulton was delighted, but though the return trip to New York was made in two hours' less time his friends still doubted, and thought that it could never make another trip. No wonder he felt discouraged. He himself wondered if such a voyage could be repeated, and if it could, whether it was of any value.

WHY ONE OF THE EARLY STEAMBOATS WAS ALLOWED TO FALL TO PIECES

Fulton was the first man, therefore, to make steam navigation what we call a commercial success. Fitch had shown that something of the sort could be done, but Fulton profited by Fitch's experience and by that of Jouffroy. He died in 1815, but not until he had built several other boats.

Fulton's successful steamer was launched in 1807. Nineteen years earlier a successful steamer had been launched in Scotland, but this was not a commercial success. It was built by William Symington, a Scotch mechanic, who was born in 1763, and died in 1831. He first of all built a steam-engine to run on the roads, then carried out the building of the steamship for a thoughtful Scotsman named Patrick Miller. Symington's vessel for Miller was succeeded by another which he built for Lord Dundas. It was launched on the Forth and Clyde Canal, and, without any trouble, towed two barges, weighing together 140 tons, a distance of 20 miles against a powerful wind. This was still five years earlier than Fulton's success. But what happened? The owners of the canal said that the steamer would create such a current that it would wash away the banks of the canal, and so this fine steamer was run aground and allowed slowly to fall to pieces on the bank of the canal. Fulton saw this vessel, and doubtless gained a hint or two from it.

A POOR MAN WHO CONFOUNDED THE WISDOM OF THE WISE

But Symington's work was not all wasted. One of the men employed in making the woodwork of his first vessel was Henry Bell, the son of poor Scottish parents. Born in 1767, he followed first one trade and then another, and seemed unlikely to do any good, until he was brought face to face with the problems which the luckless Symington was trying to solve. Symington's experiments convinced Bell that success might yet be gained with steam-vessels, and for the next thirteen years he gave all his thoughts to the plan.

We hear of him in 1800 trying to make the British Government believe in the possibility of the scheme, but he was unsuccessful. How could he hope to succeed in official circles when one of the greatest and best men of the day—Sir Joseph Banks, President of the Royal Society—could say to all the proposals for vessels driven by steam-engines: "A very pretty plan, but there is just one point overlooked—that the steam-

THE COMING OF THE GREAT STEAMSHIP

The Americans claim the honor of sending the first steamship across the Atlantic. The Savannah, shown in this picture, was fitted with engines, and crossed the Atlantic in 1819 in 27 days, but used her sails most of the way. She later became a sailing ship.

The honor of sending the first steamship across the Atlantic ocean perhaps belongs to the British, for in the year 1838 two English steamships, the Great Western, shown here, and the Sirius, steamed into New York harbor within a day of each other.

When the Great Eastern was launched at Millwall, London, in 1857, it was the wonder of the world, and no one thought such a monster could be surpassed. Its length was 680 feet, an eighth of a mile, and the engines were 1,000 horse-power. This ship cost nearly five million dollars, but it was always having accidents. Its only good work was to lay the Atlantic cable. The Great Eastern had both paddle-wheels and a propeller.

The Great Eastern has now been left far behind in size, the mammoth liners of to-day, like the Mauretania and the Vaterland, being much larger than the Great Eastern, and their engines being many times more powerful. In this picture we see the Mauretania leaving the River Tyne, where she was built in 1907. She has beaten all previous records by crossing from Queenstown to New York in 4 days, 10 hours, 41 minutes.

The photograph of the Hon. C. A. Parsons, on page 2487, is by Elliot & Fry, and that of Signor Marconi by Lafayette, London. The photograph of the Mauretania is by Messrs. Thompson & Lee, and the two top pictures on page 2489 are from the Century Magazine.

engine requires a firm basis on which to work." Talented man though he was, Banks himself overlooked one point, that even though it floated on water, the hull of a ship does give the firm basis the steam-engine requires. Bell gave up hope of encouragement from the Government, and when he had managed to get some money, he set to work in 1811 and had a little steamship of his own built on the Clyde.

How Scottish Inventors and Engineers Led the Way with Steamboats

The ship was called the Comet, and was launched in January, 1812, beginning at once to carry goods and passengers on the Clyde. Great was the terror that it created among ignorant people. They thought, as they saw it puffing along, snorting sparks and smoke, and going against the wind and the tide, that it was some evil monster. When it approached the shore to pull up, they ran away and hid themselves.

News of the Comet's success soon spread abroad, and in the year 1813 the first of the Thames steamers was run by a man named Dawson, while a courageous man named Lawrence, of Bristol, sent up a steamer from his native city to carry the people of London up and down their great river. The opposition of the Thames boatmen proved too much for Lawrence, and his vessel had to return to the River Severn. But the steamship industry was now fairly founded in spite of the "wise" men and the Government; and many ships were built on the Clyde to run between Glasgow and Liverpool and other ports.

The success of the Glasgow-to-Belfast boat in 1818 was important because this was the first ship to go out from the coast regularly, making a port in another island its goal. The owner of the Rob Roy, as it was called, was David Napier, a first-rate engineer of Glasgow. It was built by William Denny, of Glasgow, from whose works came several other steamers which set all the world wondering.

The First Crossing of the Atlantic Ocean by Steam and Sails

James Watt, whom we met on page 600, played an important part in the development, his steam-engines being largely employed. He was one of the first men to cross to the Continent by the new method, a steamship taking him to France in 1817.

From this time forth there was no more opposition to the steamship as a means of sea passage. The next important step was its first voyage across the Atlantic. This was made by an American ship called the Savannah, but she did not steam all the way. She was built as a sailing ship by Francis Fickett, of New York, in 1818; but it was decided afterwards to fit her up with a steam-engine. This was done, and she set sail for England from Savannah on May 24, 1819, reaching Liverpool twenty-seven days after.

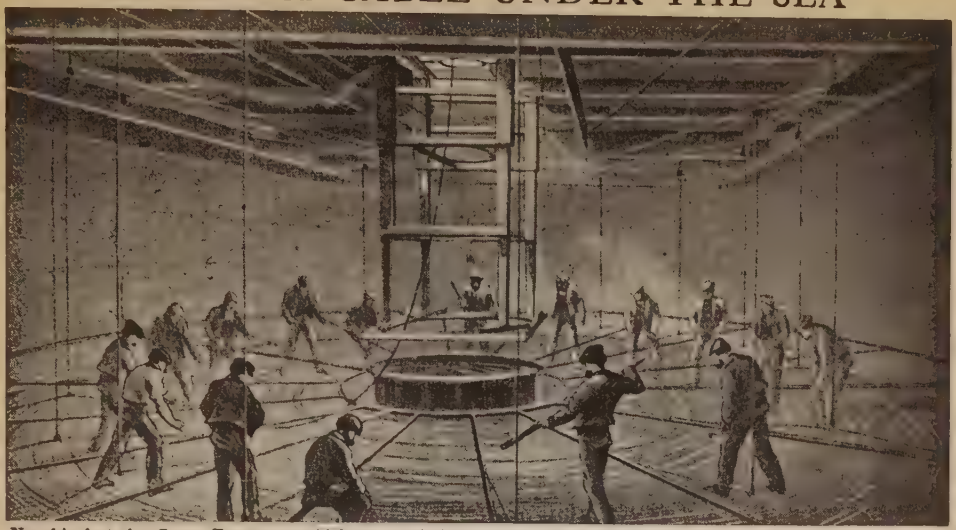
The greater part of the distance had been covered by the help of sails, steam having been used only for eighty hours. The Savannah returned to America and was not considered useful, for her engine was taken out and she depended, until she was wrecked, upon her sails. Therefore, although America claims to have sent the first steamship across the Atlantic, we must remember that she sailed for the greater part of the voyage, and steamed only a little now and then, about one hour's steaming for eight hours' sailing. Six years afterwards an English yacht, named the Falcon, went by sails and steam to India.

How Two Real Steamships Reached New York on One Day

The first crossing of the Atlantic by a real steamship was completed in 1838, when, on the same day, two English vessels steamed into New York. They were the Great Western—a steamship built by Sir Isambard Kingdom Brunel, whom we have already met on page 605—and a smaller vessel, called the Sirius. The Sirius had started from England three days ahead of the Great Western, but the Great Western, being bigger and stronger, nearly caught her up, and the Sirius reached New York only a few hours ahead. The journey had taken the Sirius seventeen days, and the Great Western only fourteen, instead of the month which a sailing ship required.

The steamboat was now a success. There was a long fight between rival sides to get the screw propeller used for driving ships instead of the old wheels at the sides called paddle-wheels, but in the end the screw won for all but smooth

LAYING A CABLE UNDER THE SEA



No ship but the Great Eastern could have carried the 2,300 miles of covered wire required for the Atlantic cable. It was stored in three enormous tanks, which were afterwards filled with water to keep the cable from getting too hot or too cold. Here we see the cable passing out of one of the tanks as it was being laid.

The first cable laid by the Great Eastern broke, and had to be grappled for five miles under the sea. When found, a buoy was let down to mark the spot.

The lost cable was found by dragging over the bottom of the ocean with a large iron with hooks. Here we see the men preparing to lower the grappling-iron.

It was only after many failures that the lost cable was found. There was much anxiety as the end was hauled up from the bottom of the sea, but just as it came into sight it slipped away, and all the work of grappling had to be done over again. Here we see the scene when at last the cable was brought on board.

waters. Similar doubt had to be overcome before the iron ship was built to take the place of wood. Still later there has come another change in the method of driving the ship. The new plan is called the steam-turbine. Many people had tried to perfect an engine on these lines, but Charles A. Parsons, a very clever Englishman, has been most successful. With his new method of driving a vessel we have bigger steamers than ever. The biggest in the world are over 950 feet in length, and carry over 3,000 people at the rate of almost thirty miles an hour.

How the Steamship Led to the Introduction of the Ocean Telegraph

The faster and farther we ourselves travel, the faster must our messages go. Therefore, when steamships began to cross the ocean, men began to wish for a method whereby news could travel still more rapidly across the waters. We read on page 2161 how men discovered electricity, and we see how the way was prepared for the telegraph cable which runs under the sea. All we need do here is shortly to recall the trials of the man who laid the first cable under the Atlantic, enabling us to have immediate communication with England. The man was Sir Charles Tilston Bright, who gained his great triumph when he was only twenty-six—the same age at which Mr. Marconi years and years afterwards sent his first message across the sea without the help of telegraph wires.

Other men, before Bright, tried to solve the problem. Sir William O'Shaughnessy Brooke succeeded in 1838 in sending messages over a wire which passed through a river in India. Professor Samuel Morse, who gave America her telegraph, and whose system of signals for telegrams is everywhere used, sent messages through a copper wire laid in the water of New York Harbor. It was a great feat, but he was terribly poor at the time. "I am crushed for want of means," he wrote. "My stockings all want to see my mother, and my hat is hoary with age."

The First Telegraph Wires that Ran from Land Out to a Ship at Sea

Next an American, named Ezra Cornell, got a cable to work through twelve miles of water. That was in 1845. The cable worked well for some months, but was then broken by ice. Cornell deserves to be remembered as the man who founded the famous Cornell University in America. In 1846 an Englishman named Charles West tried to lay a line from England to France. He got as far as Portsmouth Harbor, where, holding the end of his cable in a boat, he sent messages by it to the shore. Poverty prevented him from carrying out his scheme.

The first real success was a curious one. The cable was laid for two miles in the waters of the English Channel, in January, 1849, then brought to land at Folkestone and joined to a wire on land 83 miles long, but it carried messages to London, and back to the ship at sea which held the end of the cable.

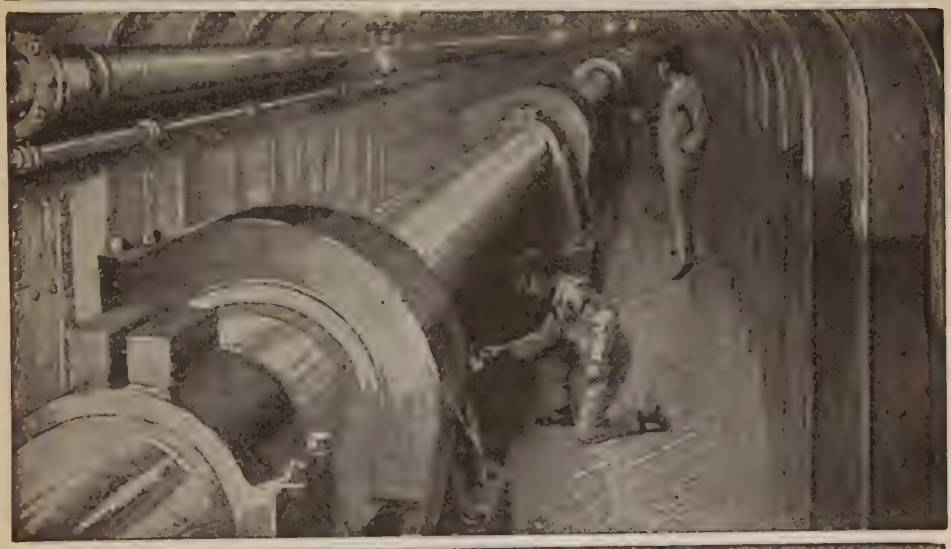
Many minds in England and America were now fixed on the idea. In America Cyrus West Field, who had made a fortune as a paper manufacturer, but died a poor man, was doing all he could to promote schemes for a cable from America to England; in Great Britain Jacob and John Watkins Brett, two brothers, were trying to get the Government's permission to start a cable between England and France. After much annoying delay they got a cable fixed from Dover to Calais, entirely at their own expense.

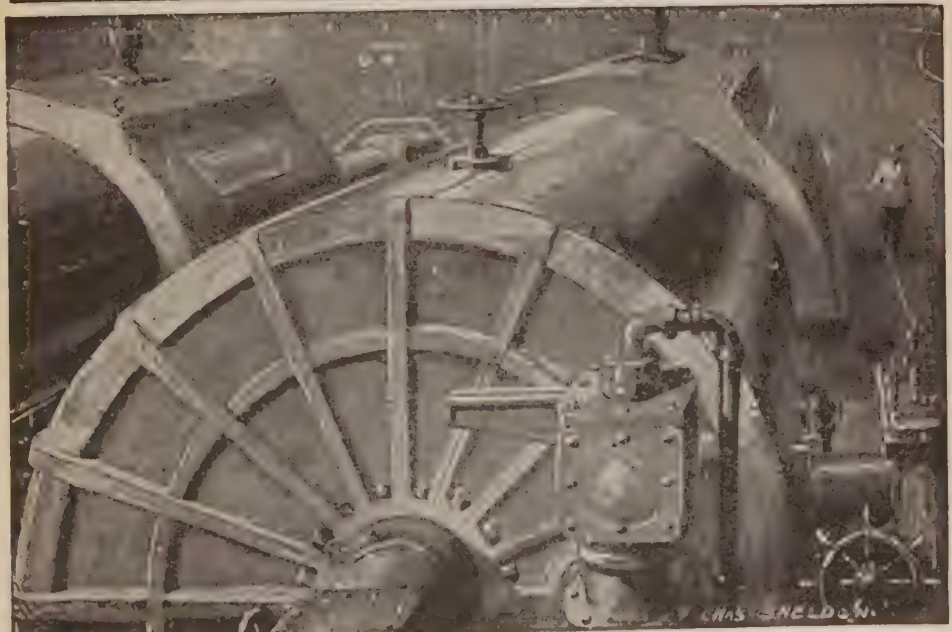
The Fisherman who Dragged up a Cable in his Net

The ship with the cable started in August, 1850, and the wire was soon landed at Calais. Messages were sent over it by Queen Victoria and the Emperor Napoleon III., but then the cable suddenly snapped; an ignorant fisherman had dragged it up with his nets and broken it in the belief that it was a new kind of seaweed! Still, the wire had served its purpose by showing what it could do. A new one was soon laid, and others linking other places followed.

People had by this time ceased to regard the cables as seaweed, or to believe that to make signals they had to pull at the cables like bell-wires. So now there was a serious proposal to lay a cable through the Atlantic, and the man chosen for the work was young Charles Tilston Bright. Of course, the wise men said that the thing could not be done. Sir George Airy, whom we have met on page 1682, was one of the most

HOW A TURBINE DRIVES THE SHIP





This turbine engine has a power equal to the strength of 20,000 horses. The bottom picture shows the case in which are concealed the steam driver blades which turn the long shaft that in its turn drives the propeller through the water, as seen in the top picture, and moves the great ship forward through the waves.

confident of the opponents. It was impossible, he said, to sink a cable to the bottom of the deep sea, and, if it were possible, such a cable would not convey signals. Well, the Bretts met Cyrus Field, who went over to England, and they formed a company and instructed Charles Tilston Bright to carry out the work of joining Britain to America by telegraph beneath the ocean.

Bright was a very young man, but he had a wise head. Born in 1832, he was to have gone to Oxford University had not his father lost most of his money. As it was, he had to earn his living, and at nineteen was already doing splendid work in establishing the telegraph system in England. Soon afterwards he laid a cable between England and Ireland. Thus he was well prepared for his work in the Atlantic.

How the cable snapped in mid-ocean and lay broken under the sea

It was on August 5, 1857, that one end of the cable was brought ashore near Valentia, Ireland. The next day the expedition set off. The British Government had supplied two ships and the American Government had supplied two. The cable had to be dropped overboard as the ships traveled to sea.

After a bad start, the ships got 380 miles out, when the cable suddenly snapped, and the two ships had to return to Plymouth leaving the broken cable at the bottom of the sea. It was necessary to raise more money to buy 900 miles of extra cable—a terrible expense. The money was found and the cable bought, and in June, 1858, the ships started off again. When they got out into the Atlantic, they encountered a frightful storm, which lasted a week. Nearly everything in the ship on which Bright sailed was smashed. Many men were injured, and the ship was so badly strained that again and again she almost sank and lost the precious 250 tons of cable which she carried. This time the ships started by laying the cable from mid-ocean, one going towards Newfoundland and the other towards Ireland. But repeatedly the cable broke, owing to the bad workmanship of those who had made it.

How a queen's message flashed along a wire from England to America

The second voyage was a failure, and blank despair reigned in England. However, a few steadfast friends bore up under the blow. They got more money and sent out another cable. Again the ships carrying the two halves of the cable parted in mid-ocean, and this time each arrived at its destination carrying the land-end of the cable with it. Thus one half was drawn up on dry land at Valentia, where the first expedition had started, and the other was landed at White Strand Bay, Newfoundland. The Englishmen who had found the money on their side of the ocean cabled to their friends who had found money in America, expressing their joy at the outcome of their labours.

Then the first public message was sent from Queen Victoria to the President of the United States. The cable lasted long enough to prove that messages could be sent by electricity under 2,000 miles of sea. In all 271 messages were sent; then, after two months, the cable ceased to work.

It was too weak, and there were many faults in it. This latest failure was very disheartening, but the great idea, now proved possible, could not be lost. During the next two years a new company was formed, and in 1865 the Great Eastern, the greatest ship built up to that time, set sail with yet another cable. This time a much stouter cable was employed. It was 2,300 miles in length and weighed many tons. But again trouble followed, for the cable broke.

The cables that carry messages along the beds of all the oceans

Still another cable was sent out, and this was finally got across, Ireland and Newfoundland being connected by it on July 27, 1866. In the following year the cable 1,100 miles long lost by the Great Eastern in the preceding year was found, and, a fresh section having been added, a second cable to Newfoundland was completed.

Sir Samuel Canning had charge of the engineering work in the Great Eastern cable-laying, but Sir Charles Bright was the company's adviser, and we may in a way regard him as the father of Atlantic cables. He did other great work in this cable-laying, and before he died, in 1881, he saw all the principal oceans lined with cables to carry news to the various points of the compass as fast as thought can travel.

THE SAUCY BUT USEFUL TUGS OF THE HARBOR

A great ship is seldom allowed to go in or out of the slip under its own power. It can neither start, turn nor stop quickly enough, and would smash everything which came in the way. Smart little tugs pull and push until the ship is either safe in the slip or is out in open water. This is the Lusitania in New York, shortly before the trip upon which it was sunk by German torpedoes, off the coast of Ireland. It seems impossible that the tiny tugs should be able to move such a mass.

2497

The cable layers and the men who built the steamships were the men who bridged the seas for us. Since their time, the great Italian, Marconi, has succeeded in inventing a way to send messages through the air—over the sea, instead of under it. We read of his life elsewhere, but we must think of him here, for by reason of his great invention those who travel on the ships, that plough through the deep waters of the sea, need no longer be cut off by silence from their friends.

In these later days, what are called internal combustion engines are used in large numbers of small sea-going boats, and even in vessels large enough to cross the ocean. These engines need no boilers to make steam, and no furnaces in which heat can be created, and of course need much less space than steam engines. It is a little difficult to describe their working because they burn their fuel within their own mechanism, but it is not difficult to understand if we remember that they work on much the same principle as the engines of the launches and motor cars, with which we are so familiar.

THE MAN WHO INVENTED THE DIESEL ENGINE

Gasoline, however, is much too expensive to use in the powerful engines required to move some of the larger ships, and in these ships engines are used, called Diesel engines, which will burn cheap, heavy oil. In some of these engines, changes have been made, and then they are called semi-Diesel engines. Diesel engines are named from their inventor, Rudolf Diesel, a German, who was born in Paris in 1867, and was partly educated in England and partly in Munich. He hoped that his engine would be adopted on most of the large ocean-going ships, and though this has not yet been done, the day may come when steam-driven vessels will be a thing of the past, and oil-burning engines, or electricity generated by them, will drive all our ships.

Even now, oil is used to make steam for many ships. Some of the battleships that guard our coasts from attack by any enemy, burn oil in their furnaces; the tank ships which carry oil from the oil wells of the United States and Mexico to Europe burn up their own freight. These large vessels are steamships, and the oil is broken, by the force of steam into spray, so that it will burn in furnaces underneath the boilers.

Diesel is the last of the men whom we can name among the conquerors of the sea, but we must remember that many are forgotten, or little known, who are worthy of remembrance on this roll of honor.

FORGOTTEN CONQUERORS OF THE SEA

The men who invented the self-righting lifeboat, and the curious air-filled life-rafts, which some of us have seen and wondered at on board a large vessel, well deserve to be termed conquerors of the sea. Many lives have been saved by the use of these wonderful boats and rafts, that in times of shipwreck, and of warfare, would otherwise have been lost.

Then, too, we ought to remember the builders of the sturdy sea-going tugs which one writer says will tow anything that will float, from any one seaport to any other.

If a steamship goes aground in a storm or fog, tugs rush to the place to pull her off, or to rescue the passengers and crew, and if possible save the cargo. Many a good ship, especially on the stormy rock-bound coast of the Pacific, has owed her life, and the safety of all on board, to the work of the tug boats, whose first inventor no one remembers.

THE LONG VOYAGES MADE BY TUGS

Tugs sometimes go on long voyages. For instance, the Dewey dock, which was built in Maryland, was taken by tugs all the way around South America by way of the Straits of Magellan to the Philippine Islands, and another large floating dry dock was towed from the River Tyne in Scotland to Callao in Peru by two large tugs.

The conquest of the sea was begun by the first man who found that he could float in the water on a log, and paddle himself along with the aid of a broken bough, and the man who invented a skin boat and learned to make a paddle to push it through the water made a long step forward. Our beautiful canoes, row-boats and launches, our staunch fishing boats and graceful yachts, the freight boats that carry thousands of tons of merchandise, the spacious ocean liners, little torpedo boats and giant warships and their inventors and builders are all descended from that first crude little boat, and its savage maker in the far off primitive days.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 2619.

WHAT THIS STORY TELLS US

ALL of you have eaten maple sugar, and all of you know how good the syrup is, but very few, probably, have seen them made. In this article you are told something of the Sugar Maple, which furnishes us with these delicious sweets, and how they are made. Maple sugar is made only in North America and most of it is made in Quebec and Ontario in Canada, and in Vermont, New York, Pennsylvania, Ohio and New Hampshire in the United States. Smaller amounts are made in other provinces and states, but those named above furnish most. The joys of the old-fashioned sugar-camp are so described as to make every boy or girl wish to be present at a "sugaring-off," in an old-time camp.

THE MAPLE TREE

CONTINUED FROM 2278

THE Rock or Sugar Maple (Acer saccharum), which combines beauty with utility, is dear to the heart of every Canadian. This is the tree which produces the maple sugar of commerce. The Indians knew all about the sweetness of the maple sap, and though it is doubtful whether they were able to make maple sugar before the coming of the Europeans, they quickly learned the lesson from their white neighbors. During the latter half of the seventeenth century the making of maple sugar was an established industry among them. But of this industry I shall write later.

Unquestionably the sugar maple ranks among the finest of Canadian forest trees. When young, its full, leafy head is often a pure oval. In the forest it frequently rises seventy feet without a branch, and spreads its leaves to the sunlight one hundred and twenty feet above its base. It grows rapidly and is a favorite shade tree. In open situations it develops at a height of eight or ten feet. Stout upright branches form, while the tree is young, a narrow egg-shaped heart, but they ultimately spread into a broad round-topped dome, often eighty feet across, with slender branchlets, which are green at first but become reddish-brown by the end of the first season of their growth

The winter buds are acute, about one-fourth inch long, with purple outer scales, and inner scales of bright canary-yellow. The bark of the young stems and of large branches is pale, smooth or slightly fissured. It becomes on large trunks one-half to three-fourths of an inch thick, and is broken into deep longitudinal furrows, the light gray-brown surface separating into small gray-brown scales.

The wood is heavy, hard, strong, close-grained, tough, light-brown tinged with red, with a thin sap-wood of from thirty to forty layers of annual growth, and a heartwood of from two to three feet in diameter in old trees. It is capable of a fine polish and is much used for the interior finish of buildings, especially for floors, in the manufacture of furniture and tools, and in shipbuilding. As a fuel it has a high value. By our forefathers it was much used for that purpose, and even now thousands of cords of maple wood are used yearly in the eastern provinces of Canada to supply warmth to the habitants. The ashes of the wood are rich in alkali and yield large quantities of potash. Accidental forms of the wood, with the grain curled and contorted, and known as curly maple and bird's-eye maple, are common, and are highly prized by cabinet makers, especially for use in fine furniture.

THE SONG OF THE MAPLE LEAF

The maple leaf has been adopted as the emblem of Canada and its praises

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are sung in song and story. The conventional maple leaf resembles more the leaf of the red or soft maple (Acer-rubrum), but it is the rock maple of which Canadians think when they sing the praises of the maple:

"The maple leaf, our emblem dear,
The maple leaf forever!
God save our King, and Heaven bless
The Maple Leaf forever.

"Oh! the land of the Maple is the land for me,
The home of the stalwart, the brave and the free,
The Rose and the Thistle, the Shamrock and Lis,
All bloom in one garden 'neath the Maple tree."

The foliage is deep green in summer. The leaf is a glossy dark green above and paler underneath. It has five main lobes, the two nearest the stem being smaller, and the curved edges between the lobes are marked with a few smoothly cut large teeth. The main veins extend directly from the petiole to the sharp tips of the lobes. The width of the blade is from three to five inches, and the length the same. The petiole is long, slender, and occasionally red. The leaves are placed opposite. The shade made by the foliage of the maple is so dense that it permits only shade-loving plants to grow beneath it. Even grass grows but sparsely there.

The glory of the maple in the autumn woods

It is the autumn transfiguration which has made people observe the beauty of the maple tree. Yellow, orange, crimson and scarlet foliage make these trees gorgeous when October comes, and they sometimes stand out in the autumn woods like tongues of flames. Even in September they will sometimes show a scarlet branch in the midst of green foliage. After the vivid color is on the maple it begins to shed its leaves; and when the leaves finally fall they form a mulch-carpet for the tree that bore them, thus adding humus from which new powers for growth are drawn. The flowers of the sugar maple appear with the leaves in May as tassel-like, nearly sessile (set close to the branch) clusters from terminal and lateral buds. The flowers are greenish-yellow, and those that bear pollen and those that bear the seeds may be borne on separate trees or on the same tree, but they are always in different clusters. If they are on the same tree the seed-bearing tassels are at the tips of the twigs and those bearing pollen are along the sides. Each downy drooping thread of a tassel bears at its tip a five-lobed calyx, which may hold seven or eight long drooping stamens, or a pistil with long double stigmas. The ovary is two-celled, but there is usually only one seed developed in the pair which forms a "key." The fruit or "key" has brown, thin, divergent wings which are about one inch long. This twin-winged form is well fitted to be whirled off by the autumn winds, for the seeds ripen in September.

Distribution of the maple tree in Canada

Maple trees bear blossoms and seeds every year. The rock or sugar maple is found in rich woods, and cool rocky slopes, and is common from Nova Scotia to Manitoba. It has a long list of virtues and its long life, noble proportions, beautiful foliage, dense shade, moderately rapid growth, usual freedom from disease or insect disfigurement, and its adaptability to almost any soil which is not too wet, make it a favorite in cultivation. It transplants easily, recovers its vigor quickly, and grows uniformly. Many of our country roads and town streets are lined by maples which are monuments to the foresight and industry and love for the beautiful in those who planted them; and from many hillsides and groves the rich green of summer and gorgeous tints of autumn maple leaves lend beauty to the landscape.

"It stands beside the cottage door,
Canada's Maple tree;
Its waving branches shade us o'er—
The emblem of the free!
In memory bright that Maple stands,
And in our dreams Canadian hands
We clasp in ever-during bands,
Beneath the Maple tree."

At no season of the year is the maple more popular than in the early days of spring. Then is the tree's yearly festival, the eagerly-looked-forward-to by old and young—the time when maple sugar is made.

How nature, the wonderful chemist, works

The starch which is changed to sugar in the sap of early spring was made the previous season and stored within the

CATCHING THE JUICE OF THE MAPLE-TREE

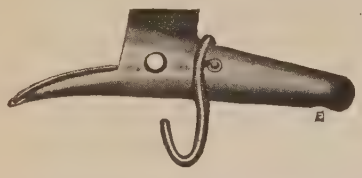
In America a great deal of the sugar used comes from a tree called the sugar-maple. Maple sugar is not used in England. A hole is bored in the trunk.

The sweet sap oozes from the tree, and little boys are fond of inserting a tube in the hole that has been bored and sucking the syrup from the tree.

The trees are tapped in time to catch the sap, which rises towards the end of the winter, and pails are hung on the trunks to receive the liquid. A single maple-tree yields from three to six pounds of sugar in a year.

tree. If the foliage of the tree is injured by caterpillars one year, very little sugar can be made from that tree the next spring, because it has been unable to store enough starch in its sap-wood and its smaller branches to make a good supply of sugar. During the latter part of winter the stored starch disappears, being converted into tree-food in the sap.

Then begins that wonderful surging up and down of the sap tide, and city trees that have been carelessly pruned often shower a rain of sweet sap on the streets below them. During the first part of a typical sugar season more sap comes from above than from below, but toward



Metal spile, with hook to hold the covered bucket, The end marked E is driven into the tree.

the end of the season, during poor sap days, there is more sap coming up from below than down from above. The ideal sugar weather consists of warm, bright, sunny days and freezing nights. During the day, when the branches of the tree are warmed by the sun, the pressure forces into the hole bored in the trunk all the sap which has found its way into the adjacent cells of the wood. Then the suction which follows a freezing night drives more sap into those cells, which is in turn forced out when the top of the tree is again warmed. The tree is usually tapped on the south side, where the sun shines longest and its action is greatest.

How maple sugar was made in the early days

Like all industries, maple sugar-making, which is peculiarly an American industry, has changed greatly within recent years. Until about fifty years ago maple sugar and maple honey were home-made and home-consumed. Cane sugar was hard to obtain and very dear, and little was used in rural homes. Each farm pantry had its barrels of cakes of maple sugar and its many gallons of maple honey. The sugar was broken into bits and used for sweetening the tea, and the cake in cooking; and "bread and honey" made the children happy.

The practices of the early settlers were not much in advance of those employed by the Indians, who, by dropping hot stones into the sap, or by freezing it repeatedly, drove off the water and obtained honey. "Tapping the sugar-bush," even in these days, are magical words to the country boy or girl in the eastern part of Canada. In pioneer days the "tapping" consisted of an unsightly slash on the tree trunk made by two cuts with an axe. The receptacle for holding the sap consisted of a trough burned out or cut out of a soft-wood log, and the sap was conveyed to the trough by means of a furrowed piece of wood or a bent piece of tin driven into the bark below the cut in the tree. These gave place to spiles of cedar or sumach driven into a hole bored into the tree with an auger, and to buckets made of staves.

Old ways pass away and new ones come

Now in their turn the picturesque old stave bucket and cedar spile are gone, and in their place the patent galvanized iron spile shown on this page not only conducts the sap, but holds in place a tin bucket carefully covered, as you see

Metal Bucket to catch the sap

in the picture, to prevent the entrance of dirt. Well do we remember those days in March or early April when father would say: "It is time to wash the sap-buckets, for we shall soon tap the sugar-bush." With buckets and spiles ready, when the long-wished-for day came, the large sap-cask (a discarded molasses cask), the large iron cauldron-kettle, buckets, spiles, chains, axes, and various other utensils, and as many children as could find standing room, were loaded on the drag or sled, and the procession started for the maple woods.

Boys and girls at work and play in the sugar-bush

The men with augers bored holes in certain trees near other holes which had

HOW THE MAPLE-SUGAR IS MADE

It is a strange sight to see hundreds of trees with buckets hanging upon them, and to watch men going around collecting the sap that has dripped into the pails. From two to four holes are bored in each tree. As soon as the tree begins to bud, the sap ceases to flow, and the sugar-collecting stops until the following spring.

To transform the sap into sugar is a very simple process, owing to the absence of impurities in the fluid. It is boiled in pans over a wood fire, in many cases in the open air. The scum is removed as it rises, and when the sugar crystalizes it is allowed to cool. About 15,000 tons of maple-sugar are produced each year in America.

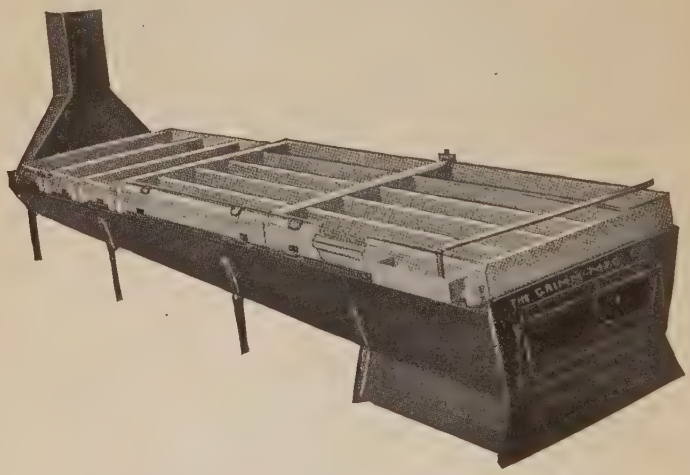
bled sweet juices in years gone by. When the auger was withdrawn the sap followed it, and many a young tongue had a lick or two of the sweet sap before the spile was driven in with a wooden mallet. Next day, and each following day, the sap was gathered in the sap-cask (hogshead) and conveyed to the camp or "boiling" place, where the large iron kettle, suspended from a log, held at each end by upright forked stakes, and flanked with two great logs against which the fire was to be kindled, was ready to receive it. Then came the best time of all, the "sugaring-off."

As the evening shades gathered, the delicious odor of the steam from the boiling sap permeated the woods farther than the shafts of firelight could pierce the gloom. How weird and delightful was this night experience in the woods! And how cheerfully we swallowed the smoke which the contrary wind seemed always to send into our faces! We poked the fire for the pleasure of seeing the sparks fly upward, and now and then added more sap from a barrel, and removed the scum from the boiling liquid with a skimmer thrust into the cleft of a long stick for a handle.

As it grew later we drew closer to each other round the fire, while we told stories learned from our grandfathers of the Indians, bears, panthers and wolves which had one time roamed through those very woods. Then there came to each a disquieting suspicion that perhaps they were not all gone even then, for everything seemed possible in those night-shrouded woods; and our hearts suddenly "jumped into our throats" when near by there sounded the tremendous, blood-curdling cry of a screech-owl.

SUGARING-OFF IN THE FIRE-LIT CAMP

After much boiling, the odor grew more and more delicious, and presently the syrup was pronounced sufficiently thick, but not before we had thrown into it a thin slice of fat pork, to prevent, by its mysterious calming influence, the syrup from boiling over. The kettle was swung off the fire, the syrup strained through a cloth strainer, and jars were filled with the clear amber-colored honey If the hour had not grown too late, part of the honey was further boiled until it became very thick. Then that most longed-for event, the "sugaring-off," took place. The hot, thick syrup was poured in thin layers on hardened snow to make that most delicious of all sweets, maple-candy; or the syrup was stirred until it "grained," and was then poured into tins to make the "cakes" of maple sugar.



A modern evaporating vat, by which the sap is turned into syrup.

Then came the home-going through the moonlight, or the dim, mysterious darkness of the starlight, when the songs and laughter of our merry bands echoed down the dark aisles of the leafless trees, startling the wild denizens of the woods, and sending them crashing through the underbrush.

In another volume of THE BOOK OF

KNOWLEDGE you are told how the different kinds of sugar are made, and on pages 2501 and 2503 you will find pictures of the old methods of making maple syrup and sugar which have just been described. Such scenes might have been seen on many farms in Canada and in the United States, only a few years ago.

pleasure in the simple joys of sugar making. The wooden spile, and trough, or wooden bucket, are now relics of the past. The iron kettle lies rusting in the shed. In its place, in carefully built sugar-houses, are evaporating-vats, set over furnaces with chimneys. To those who midst smoke and cinders brewed

This picture shows a picnic party at a modern sugar camp. Notice the metal buckets on the trees into which the sap is dripping and the tank drawn by horses into which the buckets are emptied when full. The tank is then brought to the house where some of the water in the sap is carefully evaporated and we have maple syrup. Further boiling produces maple sugar. The modern evaporator is shown on a previous page and the old-time method on page 2503.

Of course such methods could not continue, for in these days many men are devoting all their thought to finding easier and cheaper ways of doing everything. Just as the old-fashioned scythe had to give way to the mowing machine, and the hand rake to the rake drawn by a horse, so the old methods of making maple sugar gave way to the new which have been shown you in the pictures in the present article.

No longer does the old-time camp fire throw its dancing shadows on the dark tree trunks, while the woods resound to the shouts and songs and the merry laughter of a youthful band who found the rich honey of days gone by, the pale and anaemic maple syrup of to-day lacks much in flavor and richness.

"Do you say that sugar-making
Is not all a pleasure taking,
When by rain and slush beset
Rubber boots get soaking wet,—
And still the sap runs on like mad
And must be gathered, good or bad,
And then an all night's vigil keep
To toil and boil, while others sleep."

"If so be that there are woes,
Let them be portrayed in prose,
But the muses gladly sing
The delights of sugaring,
And the wonder of the juices
That our Mother Earth produces."

THE NEXT STORY OF CANADA IS ON PAGE 2575.

The National Anthem of Canada

THE MAPLE LEAF FOREVER

IN days of yore, from Britain's shore
Wolfe, the dauntless hero, came,
And planted firm Britannia's flag
On Canada's fair domain.
Here may it wave, our boast, our pride,
And joined in love together,
The Thistle, Shamrock, Rose entwine
The Maple Leaf forever!

The Maple Leaf, our emblem dear,
The Maple Leaf forever!
God save our King and Heaven bless
The Maple Leaf forever!

At Queenston's Heights and Lundy's Lane,
Our brave fathers, side by side,
For freedom, homes, and loved ones dear,
Firmly stood and nobly died;
And those dear rights which they maintained,
We swear to yield them never!
Our watchword evermore shall be,
The Maple Leaf forever!

Our fair Dominion now extends
From Cape Race to Nootka Sound;
May peace forever be our lot,
And plenteous store abound;
And may those ties of love be ours
Which discord cannot sever,
And flourish green o'er Freedom's home,
The Maple Leaf forever!

On Merry England's far-famed land
May kind Heaven sweetly smile;
God bless Old Scotland evermore,
And Ireland's Emerald Isle!
Then swell the song both loud and long,
Till rocks and forests quiver,
God save our King, and Heaven bless
The Maple Leaf forever!

ALEXANDER MUIR.

2506

WHEN THE WHITE SHIP WENT DOWN

CONTINUED FROM 2446

WE do not know very much about Prince William, the only son of Henry I., except that his father was very fond of him and that he very much disliked the people of Normandy, which his father had conquered. But there is one deed of his which we like to recall, because it shows he could think of another's safety before his own, and by it he lost his life at the age of eighteen.

Prince William's father was constantly at war with the French king, who resented the presence of the English in Normandy, and especially of King Henry, who had unjustly taken it from his brother Robert and his son.

In 1120 Henry made peace with the King of France, and set sail from Barfleur in Normandy, on his return to England. The wind was favorable, and the vessel was soon out of sight of land. Prince William and his courtiers were not ready to start with the king, and it was not until nightfall that they left the port, for the stupid courtiers gave wine to the sailors, and then the rowers were not in a fit condition to take the boat safely across the Channel. It was called the Blanche Nef, or White Ship, and was commanded by the same man who had rowed Prince William's grandfather across to the conquest of England 54 years before.

Some of the sensible people refused to trust themselves to the incapable sailors, and those who remained in the boat soon repented doing so. There was no moon, and the man who was steering drove the vessel on to one of the dangerous rocks near Alderney. There were nearly 300 people on board, and they managed to lower a boat, and put Prince William with a few others into it. Then the prince remembered his half-sister, and ordered the little boat to return to rescue her. But directly the small boat got alongside the ship, the frantic people jumped into it, and, of course, the boat was sunk.

It is said that only two men got away from the wreck. One was the captain, who afterwards drowned himself when he knew the prince was lost; the other was a butcher of Rouen, who clung on to the mast, and was picked up by a fishing boat next day. It was he who told the news of the wreck and the way Prince William lost his life, and how 140 young men belonging to noble families had died.

Not one of the courtiers dared to tell the king the fate of his only son, in whom all his hopes centred, but at last the nobles sent a weeping page to him with the tidings that the White Ship was lost, and all had perished. It is said that King Henry fainted, and was never seen to smile again.

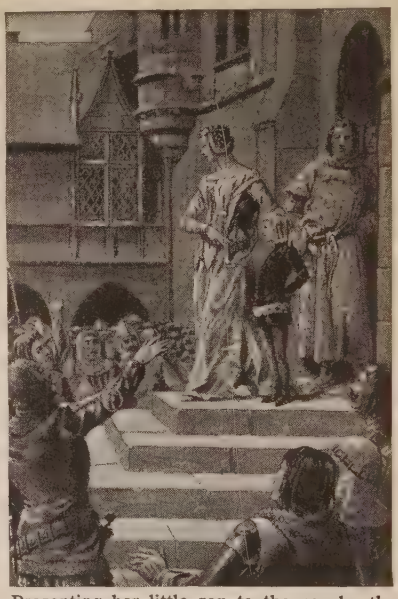
BRAVE COUNTESS JOAN OF BRITTANY

ACROSS the English Channel, in the far north-west of France, is Brittany, where the people are kinsmen of the Cornish and the Welsh, and the English kings longed for the possession of this country in the Middle Ages.

Now, it happened that a Duke of Brittany died, leaving no child to succeed him, and a dispute arose between Charles, Count of Blois, who had married the daughter of the duke's next brother, and John, Count of Montfort, the youngest brother.

Edward III. of England took the side of John of Montfort, and the French that of the Count of Blois. The French captured Nantes, where John of Montfort was, and the King of France kept him a close prisoner in the Louvre.

But John of Montfort had a brave wife, Joan, who never dreamed of giving way to her misfortunes. She summoned the inhabitants of Rennes before the castle where she lived, and, presenting to them her little son, appealed to them to rise and defend the last male heir of their ancient line of dukes. The English, she said, would surely come before long to the help of a brave people.



Presenting her little son to the people, the countess appealed to them to rise and defend the heir of their ancient line of dukes.

Her appeal to the Bretons was not in vain, and the men rallied round the countess, who then visited other towns and arranged for their defence, proving herself a skilful leader and most able general. Sending her little son over to England for safety, she then returned to Hennebont, near the coast, there to await succour from England.

The Count of Blois thought he could soon conquer a duchy defended by a woman, and so he gathered an army, captured Rennes, and besieged Hennebont.

The countess put on a suit of armor, mounted a war-horse, and was ever on the walls where the attack was sharpest, encouraging her men at every point, and directing their defence. Noticing the camp of the besiegers unguarded one day, she led 500 men to it through a postern gate in the walls, and setting fire to the baggage, diverted the attention of the enemy. Then she found herself and her little band cut off from the town, but she galloped away into safety and reached Auray. Five days later she fought her way back into Hennebont. There she found the Bishop of Leon about to surrender the town to her enemy the Count of Blois.

Day after day dawned, night after night passed, but no succour from England came to the despairing town. At last one day, when the bishop was actually discussing the terms of surrender with the Count of Blois, the countess mounted yet once more a high tower and looked towards the sea. Shading her eyes with her hands, she gazed longingly across the water. Were the English ships never coming? Ah, what was that small speck in the distance, and another, and yet another? Eagerly she watched, until now there was no longer any doubt. It was really the English fleet, coming at last to her aid.

Soon after, Sir Walter Manny brought the vessels into the harbour, attacked the camp of the besiegers, and burned it to ashes. A treaty was made by which the Count of Montfort was set free, but he died soon after in one of the frequent encounters. Through it all the English king, Edward, proved a firm friend to the countess, and supported the cause of her little son. Though after a long struggle Brittany became part of France, yet the brave countess upheld her son's rights, so that, when older, he ruled as Duke of Brittany, and was known as John of Montfort.

THE NEXT GOLDEN DEEDS ARE ON PAGE 2665.

KING BRUCE AND THE SPIDER

ELIZA COOK, a busy writer, both of prose and verse, was born in 1818 and died in 1889. She was not in any sense a remarkable poet, and the following verses, chosen for the Book of Poetry, owe their interest as much, indeed more, to the legend they relate than to the manner of its telling. But the poem has a simple vigor and a direct appeal that make it particularly suitable for young people. The story has long been a favorite one to illustrate the wisdom of "try, try, try again," as the well-known proverb in rhyme advises us, "if at first you don't succeed."

CONTINUED FROM 2455

KING BRUCE of Scotland flung himself down
In a lonely mood to think;
'Tis true he was monarch, and wore a crown,
But his heart was beginning to sink.
For he had been trying to do a great deed,
To make his people glad;
He had tried, and tried, but couldn't succeed;
And so he became quite sad.

He flung himself down in low despair,
As grieved as man could be;
And after a while as he pondered there,
"I'll give it all up," said he.
Now just at that moment a spider dropp'd
With its silken cobweb clue;
And the King in the midst of his thinking stopp'd
To see what that spider would do.

'Twas a long way up to the ceiling dome,
And it hung by a rope so fine,
That how it would get to its cobweb home
King Bruce could not divine.
It soon began to cling and crawl
Straight up with strong endeavour;
But down it came with a slippery sprawl,
As near the ground as ever.

Up, up it ran, not a second it stay'd
To utter the least complaint;
Till it fell still lower, and there it laid,
A little dizzy and faint.
Its head grew steady—again it went,
And travell'd a half-yard higher;
'Twas a delicate thread it had to tread,
A road where its feet would tire.

Again it fell and swung below,
But again it quickly mounted;
Till up and down, now fast, now slow,
Nine brave attempts were counted.
"Sure," cried the King, "that foolish thing
Will strive no more to climb;
When it toils so hard to reach and cling,
And tumbles every time."

But up the insect went once more,
Ah, me! 'tis an anxious minute;
He's only a foot from his cobweb door,
Oh, say will he lose or win it!

Steadily, steadily, inch by inch,
Higher and higher he got;
And a bold little run at the very last pinch
Put him into his native cot.

"Bravo, bravo!" the King cried out,
"All honour to those who *try;*
The spider up there defied despair,
He conquer'd, and why shouldn't I?"

And Bruce of Scotland braced his mind,
And gossips tell the tale,
That he tried once more as he tried before,
And that time did not fail.

Pay goodly heed, all ye who read,
And beware of saying, "I *can't.*"
'Tis a cowardly word, and apt to lead
To Idleness, Folly, and Want.

Whenever you find your heart despair
Of doing some goodly thing,
Con over this strain, try bravely again,
And remember the Spider and King.

THE THREE FISHERS

In this fine poem by Charles Kingsley the tragic fate that so often awaits our toilers of the sea is described with great dramatic power. We cannot read it without a feeling of sympathy for the fisherfolk, and especially for their women-kind, who have to wait with anxious hearts at home when the storm has overtaken their loved ones on the deep.

THREE fishers went sailing away to the West,
Away to the West as the sun went down;
Each thought on the woman who loved him the best,
And the children stood watching them out of the town;
For men must work, and women must weep.
And there's little to earn, and many to keep,
Though the harbour-bar be moaning.

Three wives sat up in the lighthouse tower,
And trimmed the lamps as the sun went down,
And they looked at the squall, and they looked at the shower,
And the night rack came rolling up, ragged and brown;
But men must work, and women must weep,
Though storms be sudden, and waters deep,
And the harbour-bar be moaning.

Three corpses lay out on the shining sands,
In the morning gleam as the tide went down,
And the women are watching and wringing their hands,
For those who will never come home to the town.
For men must work, and women must weep,
And the sooner it's over, the sooner to sleep,
And good-bye to the bar and its moaning.

THE LAST CHARGE OF THE FRENCH AT WATERLOO

Sir Walter Scott, the author of the Waverley Novels, is always seen at his best, both in poetry and in prose, where he is picturing in vivid words the excitement of the fray when a battle is at its most critical moment. In these lines we see how alive his verse could be under the inspiration of his subject.

ON came the whirlwind—like the last
But fiercest sweep of tempest-blast—
On came the whirlwind—steel-gleams broke
Like lightning through the rolling smoke;
The war was waked anew,
Three hundred cannon-mouths roar'd loud,
And from their throats, with flash and cloud,
Their showers of iron threw.
Beneath their fire, in full career,
Rush'd on the ponderous cuirassier,
The lancer couch'd his ruthless spear,
And hurrying as to havoc near,
The cohorts' eagles flew.
In one dark torrent, broad and strong,
The advancing onset roll'd along,
Forth harbinger'd by fierce acclaim,
That, from the shroud of smoke and flame,
Peal'd wildly the imperial name!

But on the British heart were lost
The terrors of the charging host;
For not an eye the storm that view'd
Changed its proud glance of fortitude.
Nor was one forward footstep stay'd
As dropp'd the dying and the dead.
Fast as their ranks the thunders tear,
Fast they renew'd each serried square;
And on the wounded and the slain
Closed their diminish'd files again,
Till from their line scarce spears lengths three,
Emerging from the smoke they see
Helmet, and plume, and panoply—
Then waked their fire at once!
Each musketeer's revolving knell,
As fast, as regularly fell,
As when they practise to display
Their discipline on festal day.
Then down went helm and lance,
Down were the eagle-banners sent,
Down reeling steeds and riders went,
Corslets were pierced, and pennons rent;
And to augment the fray,
Wheel'd full against their staggering flanks,
The English horsemen's foaming ranks
Forced their resistless way.
Then to the musket-knell succeeds
The clash of swords, the neigh of steeds—
As plies the smith his clanging trade,
Against the cuirass rang the blade;
And while amid their close array
The well-served cannon rent their way
And while amid their scatter'd band
Raged the fierce rider's bloody brand,
Recoil'd in common rout and fear
Lancer and guard and cuirassier,
Horsemen and foot,—a mingled host!
Their leaders fall'n, their standards lost.

THE HORSE

To Miss Jane Taylor we owe many pleasant little poems on the most familiar things of everyday life, and six or seven of her pieces have already appeared in these pages. In giving a further example from her pen, it may be remarked that this used to be a favorite piece in the school-books thirty or forty years ago, but its quiet humor and the lesson it teaches still merit for it the attention of the young reader.

A HORSE, long used to bit and bridle,
But always much disposed to idle,
Had often wished that he was able
To steal unnoticed from the stable.

He panted from his inmost soul,
To be at nobody's control,
Go his own pace, slower or faster,
In short, do nothing—like his master.

But yet he ne'er had got at large,
If Jack (who had him in his charge)
Had not, as many have before,
Forgot to shut the stable-door.

Dobbin, with expectation swelling,
Now rose to quit his present dwelling,
But first peeped out with cautious fear,
To examine if the coast were clear.

At length he ventured from his station,
And with extreme self-approbation,
As if delivered from a load,
He galloped to the public road.

And here he stood awhile debating
(Till he was almost tired of waiting),
Which way he'd please to bend his course,
Now there was nobody to force.

At last unchecked by bit or rein,
He sauntered down a pleasant lane.
And neighed forth many a jocund song,
In triumph, as he pass'd along.

But when dark night began t'appear.
In vain he sought some shelter near,
And well he knew he could not bear
To sleep out in the open air.

The grass felt very damp and raw,
Much colder than his master's straw;
Yet on it he was forced to stretch
A poor cold, melancholy wretch.

The night was dark, the country hilly,
Poor Dobbin felt extremely chilly,
Perhaps a feeling like remorse,
Just then might sting the truant horse.

As soon as day began to dawn,
Dobbin, with long and weary yawn,
Arose from this his sleepless night,
But in low spirits and bad plight.

If this (thought he) is all I get,
A bed unwholesome, cold and wet,
And thus forlorn about to roam,
I think I'd better be at home.

'Twas long ere Dobin could decide
Betwixt his wishes and his pride,
Whether to live in all this danger,
Or go back sneaking to the manger.

At last his struggling pride gave way;
The thought of savoury oats and hay
To hungry stomach was a reason
Unanswerable at this season.

So off he set with look profound,
Right glad that he was homeward bound;
And, trotting fast as he was able,
Soon gained once more his master's stable.

Now Dobbin after this disaster,
Never again forsook his master,
Convinced he'd better let him mount,
Than travel on his own account.

THE HORNED OWL

In this poem Barry Cornwall, two of whose poems we have already read on pages 715 and 1294, gives us a more sympathetic and friendly description of the bird of night than poets, as a rule, are inclined to devote to the owl. His poem also conveys a thought that is worth thinking over. It reminds us that, although we may be apt to consider the owl a lonely bird, we are wrong in thinking so, for there is a companionship of the night as of the day.

IN the hollow tree in the old grey tower,
The spectral owl doth dwell;
Dull, hated, despised in the sunshine hour;
But at dusk he's abroad and well:
Not a bird of the forest ere mates with him;
All mock him outright by day;
But at night, when the woods grow still and dim
The boldest will shrink away. [fowl,
Oh, when the night falls, and roosts the
Then, then is the reign of the hörnéd owl!

And the owl hath a bride who is fond and bold,
And loveth the wood's deep gloom: [cold
And with eyes like the shine of the moonshine
She awaiteth her ghastly groom!

Not a feather she moves, not a carol she sings,
As she waits in her tree so still:
But when her heart heareth his flapping wings,
She hoots out her welcome shrill! [howl,
Oh, when the moon shines, and dogs do
Then, then is the joy of the hornéd owl.

Mourn not for the owl nor his gloomy plight!
The owl hath his share of good:
If a prisoner he be in the broad daylight,
He is lord in the dark green wood!
Nor lonely the bird, nor his ghastly mate;
They are each unto each a pride—
Thrice fonder, perhaps, since a strange dark fate
Hath rent them from all beside!
So when the night falls, and dogs do howl,
Sing ho! for the reign of the hornéd owl!
We know not always who are kings by day,
But the king of the night is the bold brown
owl.

ROBERT OF LINCOLN

"Robert of Lincoln" is considered one of the finest bird poems ever writen; it is by William Cullen Bryant, the American poet

MERRILY swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name.
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Snug and safe in this nest of ours,
Hidden among the summer flowers.
Chee, chee, chee.

Robert of Lincoln is gayly dressed,
Wearing a bright, black wedding-coat;
White are his shoulders, and white his crest.
Hear him call his merry note,
Bob-o'-link, bob-o'-link.
Spink, spank, spink,
Look what a nice new coat is mine;
Sure there was never a bird so fine.
Chee, chee, chee.

Robert of Lincoln's Quaker wife,
Pretty and quiet with plain brown wings,
Passing at home a patient life,
Broods in the grass while her husband sings,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Brood, kind creature, you need not fear
Thieves and robbers while I am here.
Chee, chee, chee.

Modest and shy as a nun is she;
One weak chirp is her only note;
Braggart, and prince of braggarts is he,
Pouring boasts from his little throat,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Never was I afraid of man,
Catch me, cowardly knaves, if you can.
Chee, chee, chee.

Six white eggs on a bed of hay,
Flecked with purple, a pretty sight:
There as the mother sits all day,
Robert is singing with all his might,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Nice good wife that never goes out,
Keeping house while I frolic about,
Chee, chee, chee.

Soon as the little ones chip the shell,
Six white mouths are open for food;
Robert of Lincoln bestirs him well,
Gathering seeds for the hungry brood:
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
This new life is likely to be
Hard for a gay young fellow like me.
Chee, chee, chee.

Robert of Lincoln at length is made
Sober with work, and silent with care,
Off is his holiday garment laid,
Half forgotten that merry air,
Bob-o'-link. bob-o'-link,
Spink, spank, spink,
Nobody knows but my mate and I,
Where our nest and our nestlings lie,
Chee, chee, chee.

Summer wanes; the children are grown;
Fun and frolic no more he knows,
Robert of Lincoln's a hum-drum drone;
Off he flies, and we sing as he goes,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
When you can pipe that merry old strain,
Robert of Lincoln, come back again.
Chee, chee, chee.

THE OVERLAND MAIL

This poem by Rudyard Kipling shows us the hero in the man who performs the common everyday services of life, and the subject of the poem is one which every child should know.

IN the name of the Empress of India, make way,
O lords of the jungle wherever you roam,
The woods are astir at the close of the day—
We exiles are waiting for letters from home—
Let the robber retreat; let the tiger turn tail,
In the name of the Empress, the Overland Mail.

With a jingle of bells as the dusk gathers in,
He turns to the footpath that leads up the hill—
The bags on his back, and a cloth round his chin,
And, tucked in his belt, the Post-Office bill—
"Despatched on this date, as received by the rail,
Per runner, two bags of the Overland Mail."

Is the torrent in spate? He must ford it or swim.
Has the rain wrecked the road? He must climb by the cliff.
Does the tempest cry "Halt"? What are tempests to him?
The service admits not a "but" or an "if";
While the breath's in his mouth, he must bear without fail,
In the name of the Empress, the Overland Mail.

From aloe to rose-oak, from rose-oak to fir,
From level to upland, from upland to crest,
From rice-field to rock-ridge, from rock-ridge to spur.
Fly the soft-sandalled feet, strains the brawny brown chest,
From rail to ravine—to the peak from the vale—
Up, up through the night goes the Overland Mail.

There's a speck on the hillside, a dot on the road—
A jingle of bells on the foot-path below—
There's a scuffle above in the monkeys, abode—
The world is awake, and the clouds are aglow—
For the great sun himself must attend to the trail;
In the name of the Empress, the Overland Mail.

MY MARYLAND

This poem was written by James Ryder Randall, a native of the state, when he heard of the skirmish which took place in Baltimore as the Federal troops were passing through. It spread over the whole South, but its appeal was in vain.

THE despot's heel is on thy shore,
Maryland!
His torch is at thy temple door,
Maryland!
Avenge the patriotic gore
That flecked the streets of Baltimore,
And be the battle-queen of yore,
Maryland, my Maryland!

Hark to an exiled son's appeal,
Maryland!
My Mother State, to thee I kneel,
Maryland!
For life and death, for woe and weal,
Thy peerless chivalry reveal,
And gird thy beauteous limbs with steel,
Maryland, my Maryland!

Thou wilt not cower in the dust,
Maryland!
Thy beaming sword shall never rust!
Maryland!
Remember Carroll's sacred trust,
Remember Howard's warlike thrust,
And all thy slumberers with the just,
Maryland, my Maryland!

Come, 'tis the red dawn of the day,
Maryland!
Come with thy panoplied array,
Maryland!
With Ringgold's spirit for the fray,
With Watson's blood at Monterey,
With fearless Lowe and dashing May,
Maryland, my Maryland!

Dear mother, burst the tyrant's chain,
Maryland!
Virginia should not call in vain,
Maryland!
She meets her sisters on the plain—
"Sic semper!" 'tis the proud refrain
That baffles minions back amain,
Maryland, my Maryland!

Come! for thy shield is bright and strong,
Maryland!
Come! for thy dalliance does thee wrong,
Maryland!
Come to thine own heroic throng
Stalking with Liberty along,
And chant thy dauntless slogan-song,
Maryland, my Maryland!

I saw the blush upon thy cheek,
Maryland!
For thou wast ever bravely meek,
Maryland!
But lo! there surges forth a shriek,
From hill to hill, from creek to creek,
Potomac calls to Chesapeake,
Maryland, my Maryland!

Thou wilt not yield the Vandal toll,
Maryland!
Thou wilt not crook to his control,
Maryland!
Better a fire upon thee roll,
Better the shot, the blade, the bowl,
Than crucifixion of the soul,
Maryland, my Maryland!

Dear mother, burst the tyrant's chain,
Maryland!
Virginia should not call in vain,
Maryland!
She meets her sisters on the plain—
"Sic semper!" 'tis the proud refrain
That baffles minions back amain,
Maryland!
Arise in majesty again,
Maryland, my Maryland!

Old Mother Hubbard

Old Mother Hubbard
Went to the cupboard
To get her poor dog a bone;
But when she got there
The cupboard was bare,
And so the poor dog had none.

She went to the baker's
To buy him some bread,
But when she came back
The poor dog was dead.

She went to the joiner's
To buy him a coffin,
But when she came back
The dog was laughing.

She took a clean dish
To get him some tripe,
But when she came back
He was smoking his pipe.

She went to the fishmonger's
To buy him some fish,
And when she came back
He was licking the dish.

She went to the ale-house
To get him some beer,
But when she came back
The dog sat in a chair.

She went to the tavern
For white wine and red,
But when she came back
The dog stood on his head.

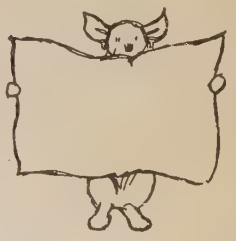
She went to the hatter's
To buy him a hat,
And when she came back
He was feeding the cat.

She went to the barber's
To buy him a wig,
But when she came back
He was dancing a jig.

She went to the fruiterer's
To buy him some fruit,
But when she came back
He was playing the flute.

She went to the tailor's
To buy him a coat,
But when she came back
He was riding a goat.

She went to the cobbler's
To buy him some shoes,
But when she came back
He was reading the news.

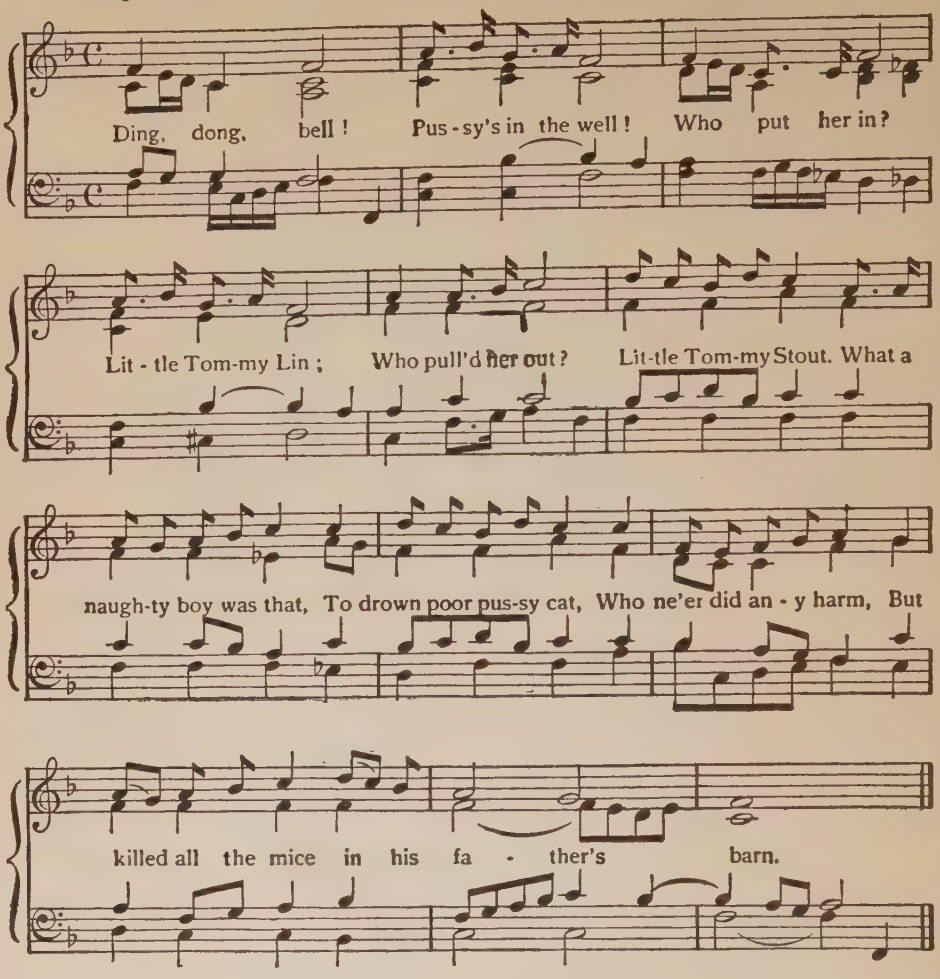


She went to the sempster's
To buy him some linen,
But when she came back
The dog was spinning.

She went to the hosier's
To buy him some hose,
But when she came back
He was dress'd in his clothes.

The dame made a curtsey,
The dog made a bow;
The dame said, "Your servant,"
The dog said, "Bow-wow!"

DING, DONG, BELL!


Ding, dong, bell! Pus-sy's in the well! Who put her in?
Lit-tle Tom-my Lin; Who pull'd her out? Lit-tle Tom-my Stout. What a
naugh-ty boy was that, To drown poor pus-sy cat, Who ne'er did an-y harm, But
killed all the mice in his fa-ther's barn.

JOHNNY shall have a new bonnet,
And Johnny shall go to the fair,
And Johnny shall have a blue ribbon
To tie up his bonnie brown hair.
And why may I not love Johnny?
And why may not Johnny love me?
And why may I not love Johnny,
As well as another body?

And here's a leg for a stocking,
And here's a foot for a shoe,
And he has a kiss for his daddy,
And two for his mammy, I trow.
And why may I not love Johnny?
And why may not Johnny love me?
And why may I not love Johnny,
As well as another body?

KING PIPPIN built a fine new hall,
Pastry and pie-crust were the wall;
Windows made of black pudding and white,
Slates were pancakes, you ne'er saw the like.

SEE-SAW, sacaradown,
Which is the way to London Town?
One foot up, and one foot down,
That is the way to London Town.

ONCE on a time I saw a bear
Who was dressing her daughter's hair.

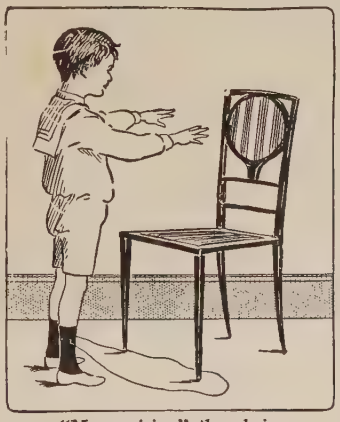
Once on a time I saw a big rat,
And under his arm he carried his hat.

THE CHAIR THAT COMES TO YOU

CONTINUED FROM 2362

ALMOST everybody has heard of mesmerism. If any boy who reads this page has not done so, it may be explained that it means a curious power possessed by some people of making other people obey their commands, even though it be to do something silly or ridiculous.

Such a power as that you are much better without; but we may learn here how to do something which seems to be even more surprizing—namely, how to mesmerize a chair and make it follow you about the room. You seem merely to place yourself in front of it, and wave your hands over it a few times with the same sort of movement that you make in swimming. When you consider the chair sufficiently "mesmerized," you walk backwards, as in the picture, beckoning it to come to you; and it follows you accordingly. At any moment anyone may pick it up and examine it, but he will find nothing to account for its curious behavior.



"Mesmerizing" the chair.

Of course, there is a trick about the matter, and, like many of the best tricks, it is absurdly simple when you know it. It all depends upon a piece of strong black silk thread, not attached to the chair in any way, but arranged in a very ingenious manner.

To prepare for the trick, take the thread, which should be about four feet long, and tie to each end of it a black pin bent into the form of a hook. You then hook one pin into the front of each stocking, if you are wearing knickers, just above the boot. If you wear trousers, the pins must be hooked into the front of each trouser-leg. The rest of the thread will lie on the carpet between your feet, and when you step backwards will form a sort of broad loop in front of you. By gaslight it will be invisible at a few feet distance, and if you are careful it will not interfere in the least with your moving about. The chair used must be of the very light drawing-room kind, and the more upright the legs are the better. If there is more than one such chair in the room, you should let the company decide which of them you shall use.

The choice having been made, you hold the chair upside down, and move it about freely, so as to let people see for themselves that there is nothing attached to it in any way. You then make a step backwards, and set it down facing you, but with one of its legs inside the loop formed by the thread, and begin to make your "mesmeric" passes as already described. You must be very serious over this. After a minute or so you say, "I should think it is now under the mesmeric influence. Chair, come to me!" At first nothing happens, so you mesmerize it a little more, and presently again say, "Chair, it is useless to resist my will. I command you! Come!"

As you say this you make a beckoning movement, and at the same time begin to move very slowly backwards. The drawing back of the foot tightens the thread, and this draws the chair with it.

You should not keep this up too long. When the chair has moved a foot or so, it is best—though still beckoning—to let it come to a standstill. Then you say, "I can't make it come any further. The power is exhausted"—or something to that effect. You then again pick up the chair, free of the thread, and offer it to anybody who cares to examine it.

Simple though it is, this is a trick which requires a good deal of practice before it is performed in public. Not only do you thereby gain confidence, but in the course of your practice you will find out exactly what length of thread suits you best, and the most natural way of drawing back so as to compel the chair to follow you without giving away the secret.

A little powdered French chalk, rubbed beforehand on the end of each leg of the chair, will make it slide easily over the carpet.

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MORE BOX FURNITURE

"DING, dong, ding, dong." Do you hear the school bell ringing? This really is not the school gong, but a musical ding-dong bell to summon the carpenters for the next lesson in Box Furniture. We are going to have a jolly time together with boxes and tools, and will forget when it's time to stop, for this kind of a school is all recess. This time we are going to make three different articles,—a General Utility Box which will be useful in several ways, a Blacking Box which will charm the school boy, and a Wall Rack which will prove very serviceable. Class Attention! Let's begin, for you are all ready with your boxes.

COAL BOX OR GENERAL UTILITY BOX

TO the average boy, a coal box may sound rather uninteresting, but to the mother who knows the value of a good-sized box of this character, it means a welcome gift. The charm of the box we are going to describe lies in the fact that it may be used for many different things, for coal, for paper, for odds-and-ends, for storing articles in the garret, when not in use, and last of all for shirt-waists. However, it can hardly be put to all these different uses at the same time. And if Mother claims it for a coal box, don't suggest to your sister that she may have it for a shirt-waist box. If you want this box, for five cents will be all you have to pay the grocer for it. In fact, if you are on the right side of your friend, the grocer, he may be glad to give you the box for a hearty "Thank you." You may also be able to find a box of the necessary size at a hardware or dry-goods shop. Ask for a medium size packing box or soap box, and measure it to see that it is about 12 or 14 inches deep, 16 or 18 inches wide and 27 to 30 inches long. A very satisfactory size is 14 inches deep, 16 inches wide and 30 inches long.

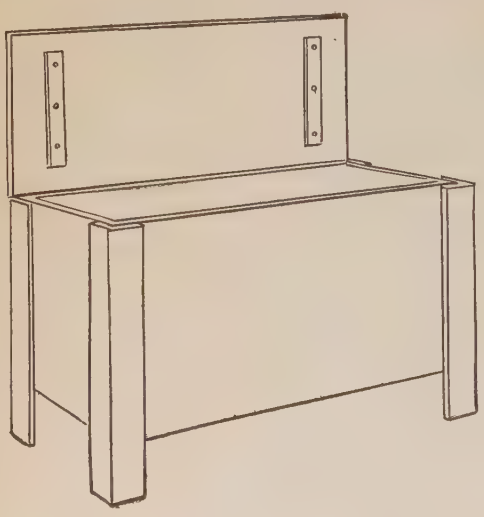
The top should be the ordinary thickness, about ½ inch or more if it is to be used as a window-seat, 3 inches wider than the width of the box, and 3 inches longer than the length of the box. You see that you cannot use the cover which came with your box for the top. Measure the box on the outside when estimating for the top. If you want your box useful as a window-seat, be sure that your top is very strong. It is better to have it ¾ inch or even 1 inch thick.

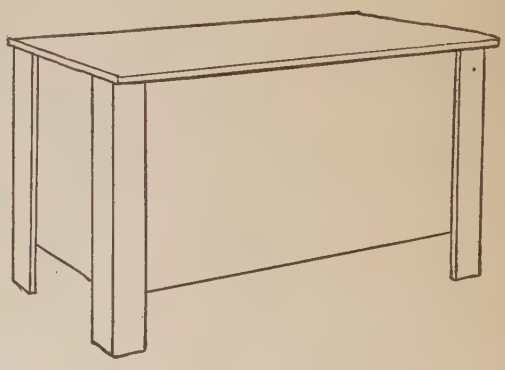
Cleats for the under side of the cover should be two strips ½ inch thick, 2 inches wide, and the length 2 inches shorter than the inside width of the box.

From the hardware store, get one pair of 2 inch iron hinges (butts) with screws ⅝ inch long.

For the legs, we need the usual four strips, ½ inch thick, 1½ inches wide, and 4 inches longer than the depth of the box; and four more strips ½ inch thick, 2 inches wide, and 4 inches longer than the depth of the box, or about 18 inches long, when your box is 14 inches deep.

Last of all we need a hinge-strip, ½ inch thick, 2 inches wide, and 3 inches shorter than the outside length of the box.





it for a window-seat, you may make a pretty cretonne cushion, and use the box part to store pillows when not in use.

THE MATERIALS NEEDED TO MAKE THE BOX.

"A box, a box, my kingdom for a box." That is what the boys are saying these days, for Box Furniture is getting very popular indeed. You need not pay "a kingdom" for

DIRECTIONS FOR MAKING THE BOX.

The list of materials needed may seem lengthy, but now that we have everything at hand it will not take long to complete the box. The legs are made in the usual way, and then screwed fast or nailed to the

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corners of the box after the lid has been removed. Take care to keep the tops of all the legs even with the top of the box. The cover is made 3 inches longer and 3 inches wider than the outside width and length of the box. It may be made of three pieces of smooth wood, butted tightly together, if you cannot find one board large enough. Place and nail the cleats on the under side, placing each cleat about 4 inches from the end of the cover. The nails may be driven from the outside and clinched on the under side of the lid.

Put the hinge-strip on the back of the box between the legs, keeping the top edge even with the back of the box at its top edge. Place the cover so that it projects the same distance all around. Put the hinges so that they are 6 inches from each end of the box. The hinges should be placed so that they can be screwed to the under side of the projecting back edge of the cover, and also attached to the hinge-strip on the back of the box. (See illustrations.) Carefully sandpaper the box, and fill with putty any cracks or holes. The box is ready for its coat of paint, or for the stain.

If it is to be used as a catch-all box and seat, the top may be upholstered by spreading a few thicknesses of cotton batting over the board, and placing over the cotton a piece of unbleached muslin which is drawn and tacked all around the edges. Over this, may be fastened some upholstery material of fancy cretonne, denim or brocade; and this may be held by large-headed nails, which give a pretty finish at the edges. You may give it a tufted effect by driving large-headed fancy nails down through the material and into the top of the lid. To conceal the legs, material to match the seat may be gathered and fastened all around the top edge. The inside of the box may be lined with unbleached muslin tacked fast in the corners and to the inside edge near the top of the box.

If placed near a window, it will make a most attractive window-seat, and may be made very comfortable and pretty with a few pillows. "Pigs is Pigs," and coal boxes is coal boxes, I suppose, except such as have been dressed up in fine style and are entitled to be called utility boxes and window-seats.

HOW TO MAKE A BLACKING BOX

BLACKING shoes is almost fun, when the blacking box is handy; and no trouble at all when, by merely lifting a lid, we find brushes, polish and all, including a brace to hold the foot so it will not slip. That is what we have in this design,—a complete blacking box. The box is small enough to slip out of sight when not needed, and yet large enough to be of practical value.

Materials Needed.

For the main part, we need one butter box, which will be about 5¾ inches deep, 13¾ inches wide, and 14¼ inches long. For the top, we want two pieces of white wood ½ inch thick, each 1½ inches wider than half the outside width of the box, by 3 inches longer than the outside length of the box.

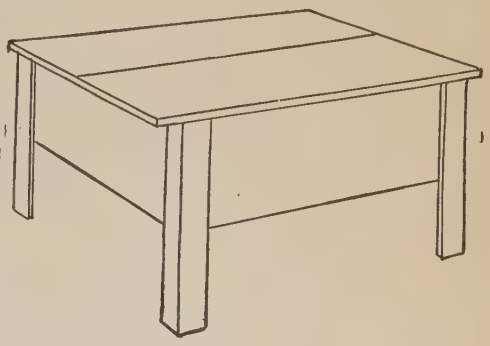
For the legs, we require four strips ⅜ inch thick, 1⅜ inches wide, by 7 inches longer than the outside depth of the box; and four more strips ⅜ inch thick, 1¾ inches wide, by 7 inches longer than the outside depth of the box.

For the sole-block, we want one block of wood 2 inches thick, shaped like the sole of a shoe. If you prefer, you may buy at the store a regular block like the boot-black uses.

In the line of hardware, we need some screws, and two 1½ inch hinges. The most desirable hinges for this purpose are the kind known as butt hinges.

Directions for Making.

Make the legs 7 inches longer than the outside depth of the box. The legs, you remember, are made by nailing together two strips, a narrow and a wider one, in such a way



that a right angle is formed. Remove the cover. Turn the box on end and nail on the legs. Now you may stand it right side up on the legs, and then nail on one part of the cover, allowing it to project evenly on the side and ends. You may hang the other half of the cover, placing the hinges in the joint between each half cover. Then, cut the edges of each half cover to let the hinges in even. Nail the sole-block on the under side of the hinged half of the cover. When you are ready to use your blacking box, turn this hinged side over on the part that is nailed down, and place your foot on the block.

Our blacking box is now complete, and ready for the varnish if we care to finish it in that way. However, it is quite as useful, though not as pretty, if we leave it without a stain or varnish. Before applying the paint, if you decide to finish it in this way, sandpaper the box and putty up all cracks or seams. Then paint it dark drab, brown or olive green. Two or three coats will be sufficient to cover the wood and give it a good appearance. If you use a prepared varnish, the weathered-oak finish is the most popular one. If your room is finished in white, you may

make your blacking box match by applying two or three coats of white, allowing each to dry before putting on the next.

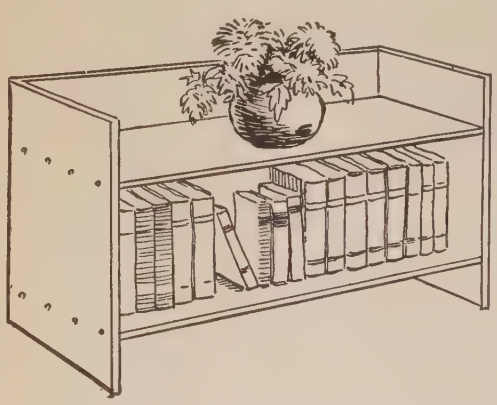
Every boy will surely want a handy box, when he knows how simple it is to put together, and how inexpensive it is.

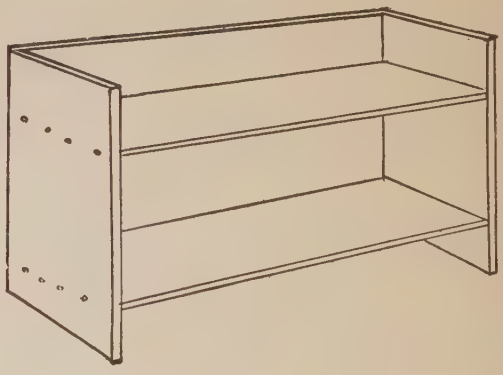
SMALL WALL RACK

THERE are a hundred uses for a wall rack. Placed conveniently over a desk, it will hold a number of reference books, and a bowl of pretty flowers on the top shelf. Placed in the sickroom, it will hold the medicines for the convalescent child, and a vase of fresh posies on the upper shelf. Placed in the kitchen, it will prove a great joy to the cook, for it is useful for holding the salt and pepper and the sugar bowl and the spice jars. These are merely a few of the ways that this handy article may be used.

Materials Needed.

Now we are ready for the box and the boy and his enthusiasm. His enthusiasm is needed in finding just the right kind of box for this rack. Hunt up your grocer and ask for a condensed milk box. If he has not a box with that name, keep busy until you find a box that has the following dimensions,—about 8 inches deep, 13 inches wide, 19 inches long. We also want two picture hooks and some picture wire.





Directions for Making.

Carefully remove the cover and set it aside, for you will want it later. Take off both sides by withdrawing the nails, and cut off each end of the sides, making them the exact length of the box inside. Keep up that enthusiasm, for there is more work to do. With your pencil and ruler measure and mark on the two ends of the box, a distance 2½ inches from the side edges. Set the sides in, keeping their outside faces on the pencil line, and secure them by nails driven through each end and the bottom.

Plane off all the edges necessary to make them even with each other, using sandpaper afterward to remove any blemishes. Bore a hole ⅛ inch in diameter in the centre of each end, 4 inches down from the top edge of the rack. Insert the hanging wires through the holes from the outside, and knot their ends tightly.

OTHER USES FOR THE SMALL WALL RACK

As a Wall Bracket for a Vase of Flowers.

The wall rack which has already been described may be used for a wall bracket to hold a vase, if we hang it up from one end only. There is then room for a tall vase of flowers to stand inside. Holes are bored 2 inches from the side edge and 4 inches from the back, and wire inserted.

As a Pipe Holder.

This same rack may be used for a pipe holder for grandfather. It is to be used on the wall in the same way as the vase rack by turning it on its end. A number of holes are bored in the top end a half inch in diameter or just large enough to hold the stems of the short pipes. Little hooks, driven in the back near the top, will serve to hold the long pipes; while slight depressions gouged ½ inch deep on the inside face of the bottom end will hold the bowls.

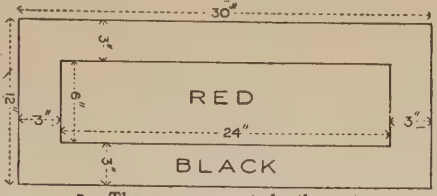
As a Kitchen Handy Rack.

Would you imagine that one article could have so many uses? By making a few changes our wall rack may be useful to the cook as a holder for spoons, knives and forks, salt, a rolling pin, etc. With your pencil and ruler, find the middle of the top shelf. Then measure off to the right and left, distances of 2 inches, and mark the points on the edge of the shelf. Measure back 2 inches from the front edges of the rack and place six points 2 inches apart. Then bore two rows of holes ¾ inch in diameter. The centre of the first row is ¾ of an inch from the front edge. Cut slots ¼ inch wide from the front edge to the first row of holes. In boring the holes, be careful not to tear off splinters, and as soon as the point of the bit is felt coming through the wood, take it out and bore from the other side to make your holes smooth.

HOW TO MAKE A LITTLE WOOL MAT

A CANVAS rug mat, which is quite easy to make, can be used to go under the piano or the writing-table, or, if we like to make a tiny one, it will do for a doll's baby carriage or a toy motor-car.

Let us make, for a first attempt, quite a small mat, say, one measuring thirty inches in length and twelve inches in width. One advantage in letting the mat be twelve inches wide is that a canvas that width can be bought at so much a yard, so that all we have to do is to cut off thirty-one inches from the yard length; the extra inch is to allow for folding over half an inch for tacking at each end. These folds need stitching down securely, because the canvas is stiff and springy, and the rough edge ravels easily.



1. The measurements for the mat.

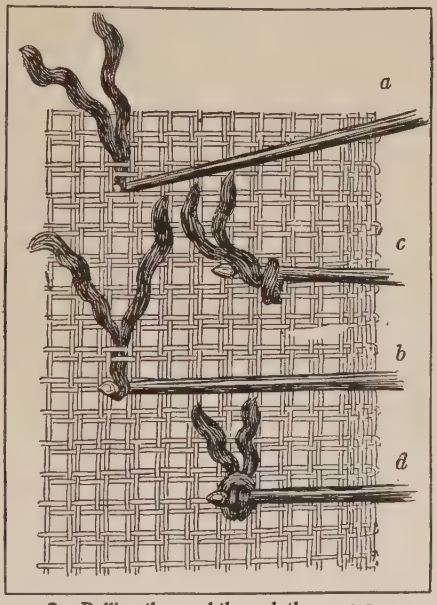
The next point to decide is the kind and quantity of wool. Girls and boys who are good at reckoning will find the canvas for our mat has two and a half square feet in it, and we shall want about three-quarters of a pound, or 12 ounces of twisted cable rug wool at about 50 cents a pound for each square foot of canvas. Sums in carpeting and papering are sometimes dry, uninteresting things to do, but we are going to find a carpet sum useful in planning our own mat. Have you found how much wool we shall want? Nearly two pounds, is it not? Then we will buy two pounds, for the small quantity left over will be certain to come in useful when making another mat.

But we do not want all the wool to be of the same color. Our rug must have a border round it of another shade. Suppose we buy three-quarters of a pound of red wool for the centre, and the remaining one and a quarter pounds of black wool for the border.

We shall need a wood gauge, costing a few cents, or a strip of cardboard for measuring off lengths of wool, because it is necessary to have all the little pieces of wool for the mat exactly the same length. We also want a rather large wooden crochet hook, and to line the mat when finished we shall need half a yard of some dark material such as black linen. A suitable kind is sold at most dry goods stores usually measuring forty inches in width.

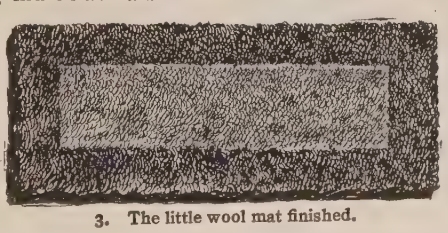
Having collected the materials, we set about planning our mat. Look at picture 1. With a pencil or piece of chalk we mark the border on the canvas at the same distance from the edge—three inches all the way round, so that the central part measures twenty-four inches by six.

Next, we take the black wool and wind it round the gauge or piece of cardboard—about four inches long—winding evenly, but not straining the wool. Then we cut along the groove in the gauge, or along the end of the cardboard.



2. Pulling the wool through the canvas.

With the canvas before us on our knees, and the right side uppermost, we take up a piece of the black wool, untwist the two strands, and, doubling one of them in halves, apply the loop with the fingers of the left hand to the hole in the right top corner of the canvas. With the crochet hook in the right hand we pull the loop down through the hole and up through the next hole to the right. Still keeping the hook in the loop of wool, we next draw the two ends of the wool through the loop so that they stand up from the canvas erect. This is quite easy to do, though it takes many words to tell how it is done—*a* and *b* in picture 2 show the hook through the hole; *c*, the ends being caught by the hook; and *d*, the ends on the point of being pulled through the loop. We tighten and adjust the ends with the fingers; then we take up the other strand of the split wool and fasten it in through the next hole.



3. The little wool mat finished.

We proceed with the same wool along the edge of the canvas until we have filled the rows of holes three inches deep. Now, continuing with the black wool at the beginning and end of the row only, we fill the middle part of it with the red wool. We go on filling up the rows like this until we reach the beginning of the three-inch border along the second side, and from that row continue with the black wool only.

If at any point we find the wool getting too thick and close together, the best thing

to do is to leave a hole empty of wool. We have chosen black for the border and red for the centre, but twisted rug wool is made in many colors, and there is a large choice of reds, yellows, blues, browns, and greens. We should, of course, think of the color of the carpet when choosing the colors for the mat, and let them match or blend with that.

Having filled the canvas, we now look it over carefully, give the rug a good shake, see that the strands of wool are all the same length, and cut even with the rest any that stand out.

Now we must see about lining the mat with the black linen. This is first cut to the shape of the mat, the edges are turned in, and it is laid, glazed side out, on the back of the mat. It is then sewn neatly and evenly with strong thread round the edge of the canvas. We must be careful to press the wool quite away with the left hand while we are sewing, or we may possibly catch it in the thread.

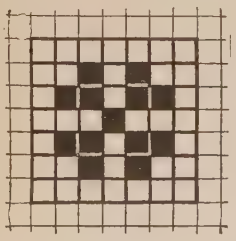
For the little mat which we have been making we have been splitting the twisted cable rug wool into two strands. If we wanted a heavy mat with very thick pile, we could leave it untwisted. In this case we use the same quantity of wool, but work into every other hole of the canvas. Jaffa rug wool at about 40 cents a pound is also used for rug work. It is composed of six fine strands instead of two thick ones as was the case with the wool used in making our mat.

All kinds of pretty patterns are possible in canvas work, and even a patchwork mat of odds and ends left over from previous mats may look very well. But it is unwise to attempt very complicated patterns at first. Having once made a mat to our satisfaction, it will be easy to make another much bigger, which might be used for a carriage rug, a hearth rug, or perhaps for a footstool cover.

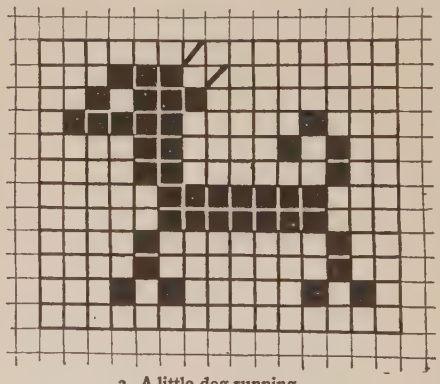
WHAT TO DO WITH A CHEAP EXERCISE BOOK

IF we get a cheap exercise book ruled in squares, which can be bought at any stationer's store, we shall be able to make all the pictures on this page and many others which we can invent for ourselves. All we have to do is to fill in the squares with crayons or black lead pencil or different colored inks. Let us begin with a simple pattern like the first picture on this page, and try to copy it very neatly and carefully. We must begin at the top and count the squares as we color them in. Let us take the first line. We will make up our mind where we are going to start in the exercise book and then, as we do the first square, say "*make* a square," then "*miss* a square," then "*make* a square." This gives us our first line. Now between the two squares that have been filled in in the first line we color a square in the second line, and after this is done the third line can be done in the same way as the first. Thus we have our first sample pattern.

1. An easy pattern.

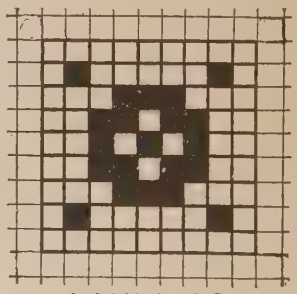


2. A tiled wall.

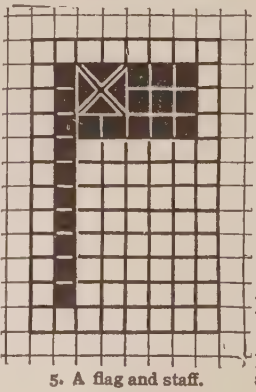


3. A little dog running.

If we have crayons, or colored pencils or inks, we can make the middle square red and the others blue or green or yellow. If we like, we can make a row of patterns like this, and then we can try something more difficult like the patterns shown in our second and fourth pictures. The second is like a tiled wall, and the fourth like the floor of a church. Now let us try something more difficult still, and at the same time more interesting, like the flag in picture No. 5. In order to get the cross at the top left-hand corner, we have to treat the squares there a little differently, but the picture shows us clearly how to do this. And now, having had so much practice, we can begin to make all kinds of pictures, animals, birds, flowers, engines, houses, castles, and so on. The little dog which is shown in the third picture on this page shows us how to make curves and bends like those of the tail and legs.



4. An inlaid church floor.

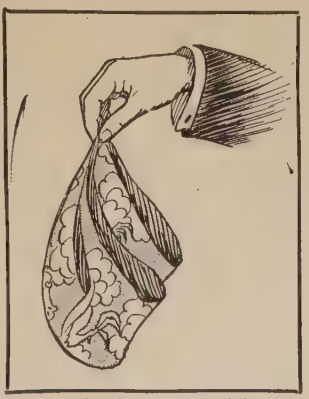


5. A flag and staff.

When you have learned to do these in pencil, buy at any toy store some sheets of *pricked* paper. You will find tiny holes pierced in the corners of the squares, and you can make these same patterns in silk crosses with the aid of a needle by taking the thread in and out of the paper from corner to corner of each square.

THE WIZARD'S POCKET-HANDKERCHIEF

ON page 1361 we learn how to "lose" a coin from a handkerchief. In this case a coin is likewise made to disappear, but after quite a different fashion. The handkerchief used is a colored one, and the wizard's own property. We will suppose that the trick is to be performed with a quarter. The conjurer gathers up the four corners of the handkerchief, as in picture 1, and has the quarter dropped into the sort of bag thus formed. He proves that the coin is really there by making it chink against the table-top, or allowing somebody to feel it through the handkerchief. But presently he says: "Quarter, vanish!" or something to the same effect, and the coin forthwith departs. The handkerchief is shaken out, but nothing falls. But the performer explains that the coin has merely stepped round the corner, and will come back again if desired. Again he gathers up the four corners of the handkerchief and says: "Quarter, come back." Again he makes it chink upon the table, and allows anybody to feel that it has really returned. He now says: "Quarter, pass into that vase upon the sideboard," or any other place he likes to mention. Once more the coin has disappeared, and is found where he has told the audience that it would go. The secret here lies in the handkerchief which is one that has been specially prepared for the purpose of the deception. If the young reader is a boy, he will have to get the assistance of some relative—a sister, a cousin, or an aunt—to make it; if a girl, she can do the needful work for herself.



1. The handkerchief held by the four corners so as to form a bag.

The pattern of the cloth of which the handkerchief is made does not matter, but it must be double, being in fact two handkerchiefs of the same pattern sewn together all round the edges, save for one small opening. This is at the corner B in picture 2, where for a space of an inch and a half each way the two handkerchiefs are not joined together. This leaves a space between the two handkerchiefs, and this space is the secret of the trick. The two handkerchiefs must also be joined together by a diagonal line of stitching from the bottom of the opening at B to a point an inch short of the C corner. As it is important that this line of stitching should not be noticeable, the handkerchiefs used must be somewhat dark in color, and the more intricate the design the better it is.

When it is proposed to show the trick, the first step is to hide a quarter beforehand in some convenient place to be found there when necessary afterwards. The handkerchief must be held in the first instance spread out four-square, the corner A between the thumb and fingers of the left hand, and the corner B between those of the right, but with the little mouth at B kept open by inserting the tip of the forefinger in it. The performer then gathers up the other corners one by one into this same hand, forming a sort of bag, as in picture 1. He then asks someone to lend him a quarter, and to drop it himself into the bag thus formed, in reality offering him the opening at B, so that the coin actually falls into the space between the two handkerchiefs. To avoid mistake, it is well, for the moment, to hook both forefingers into the opening. The coin may now be made to rap upon the table, or be felt through the handkerchief. This done, the performer lets loose the corners C and D, but nothing falls, the quarter running down the line of stitching to C. By again picking up the four corners, the coin is brought back to the centre.

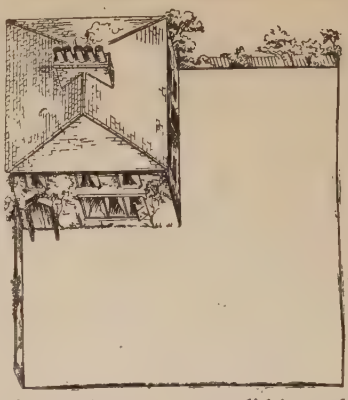
2. The secret of the magic handkerchief.

The performer now orders the quarter to go to the spot where he has placed the duplicate coin, and once again shakes out the handkerchief, four-square. He then drops the corner A, and with the left hand takes hold of the corner C, holding the handkerchief straight up and down, and giving it a shake as if to call attention more forcibly to its entire emptiness. While the attention of the spectators is occupied in seeing whether the quarter has reached the place named, he works the first coin through the opening into the left hand and gets rid of it.

If you perform the trick neatly, you may be asked to do it again, but it is seldom wise to do a trick twice over before the same spectators. Should anyone press for an *encore*, your best plan is to exhibit instead some trick more or less resembling the first one. In the present case, the disappearance of the quarter makes a capital introduction to that of a coin, as described on page 1361. You agree to "do it again"; and this time you say you will use another coin and somebody else's pocket-handkerchief. You keep your word—that is, you again lose a coin from a handkerchief; and the trick being the same *in effect*, the audience does not realize that it is really quite a different one.

HOW DID THE FATHER DIVIDE HIS GARDEN?

A GENTLEMAN, who was a merchant in the city of London, decided to live a little way out in the country, where he could have a larger garden than could be obtained in town. So after looking about for some time he found a very nice house with a fine garden, and the house stood on one quarter of the ground as seen in our birdseye view of the place. After taking his wife to see the house, the merchant bought it, and soon moved with his family to the new home. Now, this gentleman had two sons named Harry and Leslie, and two daughters, Doris and Gertrude, and they were all very fond of gardening. They at once asked their father to divide the garden up among them, and to allow them to cultivate it, and when the summer came they would see whose particular part had the best show of flowers. The father readily agreed, for he knew that his children would do their best, and this arrangement would save him the trouble and expense of engaging a gardener. Besides, it would provide plenty of healthy recreation for their spare time, and so he said he would divide the garden up into four parts of equal size and shape, and give one to each. The boys and girls could not see how their father would be able to do this, because the garden was already such an awkward shape that it did not seem at all an easy matter to divide it as he said. But the gentleman did it, and the boys and girls agreed that it was really very simple after all. How was the garden divided as the father promised?



SOLUTION TO BE FOUND ON PAGE 2583

A CAGE MADE OF CARDBOARD AND PINS

THE little cage of mice shown in the picture is made of cardboard and pins, and costs a good deal less than a dime.

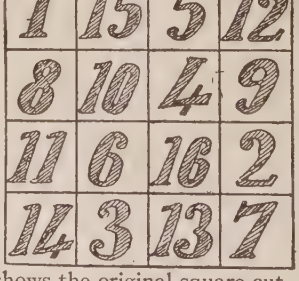
First we buy a large sheet of perforated cardboard. A store which supplies kindergarten goods will sell us this. Then we cut out of this sheet two pieces, each measuring two and a quarter inches long and two inches wide.

We want some large brown apple-pips, which we can save from the next apple we eat.

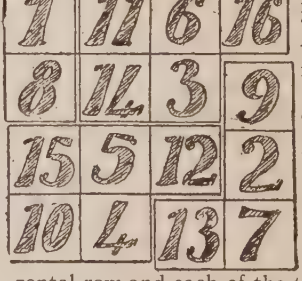
We choose a rather fine needle, thread it with black cotton and pass it through a pip, beginning at the narrow end, and leaving a piece sticking out to form the tail. We then pass the needle down through a hole in one of the pieces of cardboard, stitch down the tail where it joins the body, and secure the cotton on the under-side of the card. Two or three more mice are dotted about the card in the same way. Next we get some bright new pins to fit the holes in the card without slipping out, and these we run through the holes along the edge of the second piece of card. A notch at the end imitates the door in the cage, as seen in the picture; and the pins follow round the edge of the notched part. We press the pin down so that its head lies close to the card. Then we put the point of the pin into the corresponding hole in the card with the mice in, and this forms the floor of the cage.

HOW THE MAGIC SQUARE WAS MADE

A STUDY of the two illustrations given here shows how the figured square, shown on page 2356, was cut up and put together again in a different way, so that it became a magic square—that is to say, a square, each column, horizontal row, and diagonal of which, when added up, gives the same result.



The first picture shows the original square cut into four pieces, one piece containing two figured spaces, another piece four figured spaces, and the remaining two pieces each containing five figured spaces. The second picture shows these four pieces arranged in a new and magic order. It will be found that every column in this arrangement makes 34 when added up, and that every horizontal row and each of the two diagonals give the same result, thus forming a magic square.



WHAT SCENE IN HISTORY IS THIS?

THE GAME OF "WHAT IS IT?"

HERE are some puzzle games to be played sitting round the fire, similar to those which appeared on page 2362. Below are descriptions of famous scenes in history. The solutions will be found on page 2588.

AN ANGRY SCENE IN A TENT

1. We are in a tent in a meadow by the bank of a river. In the tent are gathered a number of men armed after the fashion of the Middle Ages, and through the opening of the tent we see troops standing. The men in the tent look angry and determined, and bend threatening looks on one who is the centre of attention, and wears a crown. The foremost man of the group is urging him to put his sign to a document spread out on a table before him. At last he consents, sets his seal on a lump of wax, and throws himself on the ground in a rage. Who is he, and what is the deed that he has been forced to do by others and now so very much regrets?

THE LANDING OF A BRAVE BAND

2. We are on the coast of a wild, uncultivated country. Behind the bare rock on which we stand, forest stretches away inland. Off the shore is a small bark at anchor, and from it we watch men, women, and children landing. They are dressed in plain garments, and seem to belong to the artizan class. They are evidently weary, yet how brave they must be to cross that wild sea in their small boat of 180 tons, and land with their little children on an unknown shore. Who are they and why have they come here, where there is neither shelter nor food ready for them?

THE ROBBER AND THE LITTLE PRINCE

3. It is a time of anxiety and danger. All the countryside is disturbed by war. A battle has just been fought, and in the forest, near the battlefield, a mother and her boy have sought refuge. While wandering about hoping to escape notice, some robbers discover the mother and her little son, and take from them their money, jewelry, and food, and then leave them. It is April. The trees are leafless, and the poor mother is anxious for her boy, who has been reared in the comfort of palaces. While seated on a tree-trunk, she hears a footstep on the dry leaves, and, fearing it is another robber, her heart fails her. Then she thinks of her boy, who should one day be king of England. She rises and faces the newcomer, who is indeed a robber, but her pleadings rouse the pity of the man, who promises to take her and her boy safely to the coast, so that they may be able to escape to France. What incident is this, and does the robber keep the promise that he has made to take them to the coast?

THE WRITING ON THE CHURCH DOOR

4. Before us is a heavy church door studded with nails. A monk advances from the street holding a paper in his hands. He has a look of stern determination, and walks straight up to the church door. Now we can see that the paper is covered with writing. The monk takes from a bag a hammer and some nails, and fastens the document on to the door; then he stands aside to watch the result. Some townsmen have been watching him, and curiosity prompts them to see what the daring monk has nailed to the church door. Three years later, at the gate of the castle near by, the same bold monk burned in a bonfire another document, while the people stood round in a crowd and watched him. Who was the monk, and what were the documents?

AN INTERRUPTED GAME OF BOWLS

5. We have before us a bowling green, where men are intent on their play. Near by stands a man gazing out to sea across the harbor. He pays no attention to the game, but stands shading his eyes from the sun with his hands. Suddenly he sees something, for he turns, and, striding up to one of the players, eagerly points out to him the beacon being lighted close by. But to his surprize the player goes on with his game of bowls, coolly remarking: "There is plenty of time to finish the game and beat the Spaniards too." Yet, all around, people are gazing out across the harbor, or making hurried preparations. Evidently some great event is about to take place, and all the men look determined though anxious. What incident is this?

THE GREAT MAN ON A LITTLE ISLAND

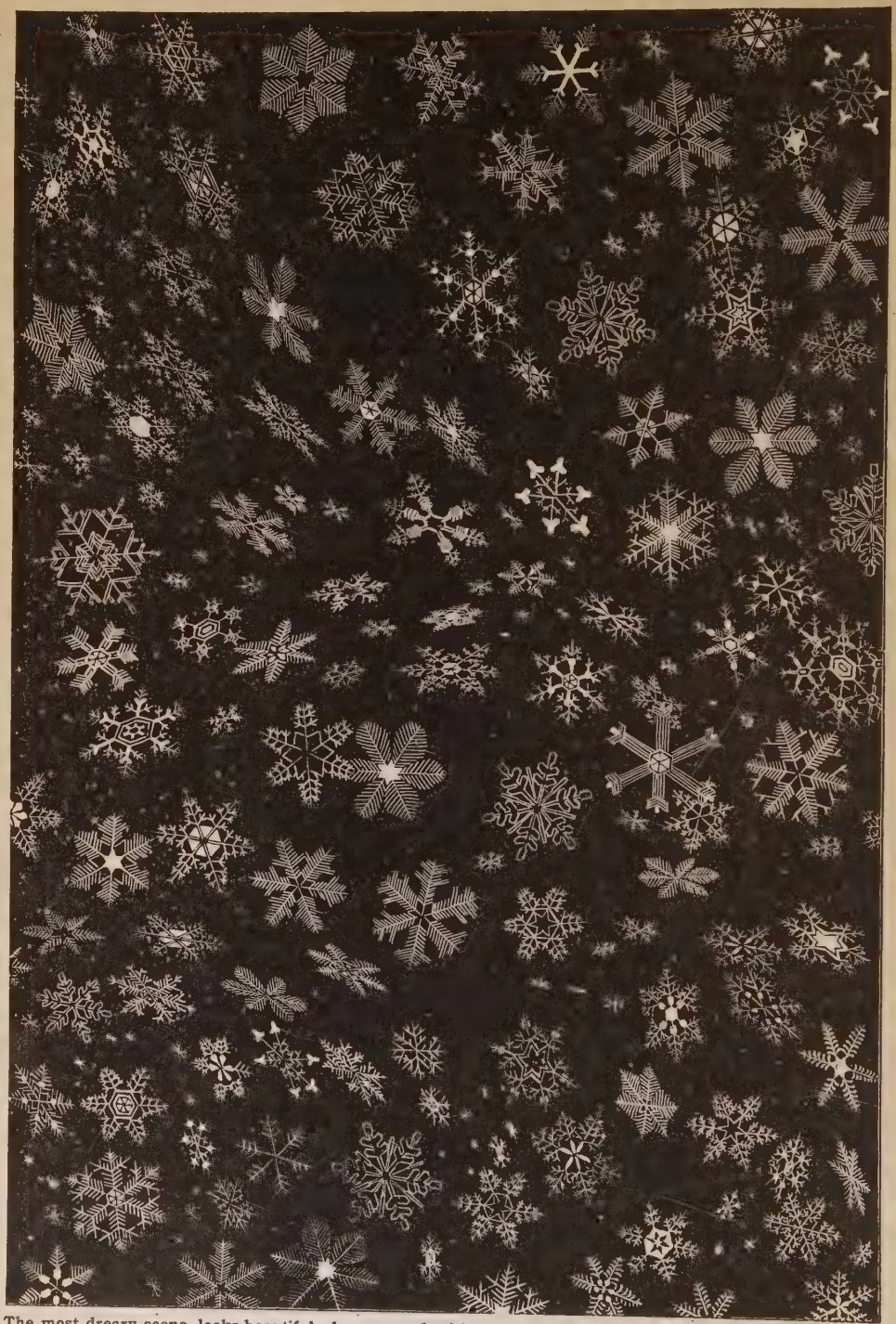
6. We are on a small island, only about 86 square miles in extent, in the blue waters of the Mediterranean and within sight of the coast, where fishermen and iron-miners live. Before us is a large building, and through one of the windows we see a man seated at a table. He looks sullen and unhappy, as though he were brooding over his misfortunes, for he has fallen from greatness. Yet the power that he had was not used to help mankind; rather was it used to overreach others and subdue them to his will. No wonder he is unhappy and looks miserable! Sitting there in gloomy thought, he plots how he will escape from this island, which was given to him as his dominion, because it was thought he could there do no further mischief. Who is the man described here?

THE ANSWERS TO THE GAME OF WHERE IS IT ON PAGE 2362

ON page 2362 are some descriptions of places to be guessed. These are the places: 1. Benares, India. 2. Petrograd. 3. Upper Burma. 4. Cape Town. 5. Plymouth Hoe, England. 6. Canadian Pacific Railway in Manitoba. 7. Tahiti, Society Islands, Pacific Ocean.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 2581.

WHITE JEWELS THAT FALL FROM THE SKY



The most dreary scene looks beautiful when covered with a mantle of snow, but it is not only thus that snow is beautiful. If the newly fallen flakes are examined through a magnifying glass, they are seen to be made of delicate crystals arranged in star-like forms as here. It is rarely, however, that more than one or two of these forms fall at one time. When the flakes are pressed together, they lose these dainty shapes.

WINTER'S WHITE DIAMONDS

CONTINUED FROM 2433

THERE are many roads that lead to fairy-land, and many fairy palaces when you arrive in that beautiful country. Shut your eyes for a moment and we will go to the Palace of the Frost King. Where is it? High up above the earth; far above the clouds, in the wide realms of space.

There, where it is cold and still, the tiny drops of moisture in the air crystallize into snowflakes which the uprushing winds support until they are ready to obey King Frost's commands. The snowflakes are very small at first, but helped by Air and Water and Electricity they soon gain in structure and weight, and begin to fall. As they descend they make war with the elements. Some enter dark, surging masses of cloud, and when they emerge their external form is changed, and they have become larger and less regular in outline. Others pass through gray stretches of cloud where it is so cold that the little snowflakes hug themselves close together and hurry on. Then a rollicking, boisterous wind meets them and waves them up again towards the sky, but their snow brothers are pouring forth in countless numbers from the realms of space down upon the world, and they too turn earthward again.

At their coming the world is changed and beautified and silenced, for the Frost King allows no sound but the report of his own gun as it discharges in the heart of a tree or in the depths of a rock when he goes hunting. He himself comes to earth most often in the night, for he works best beneath the light of the stars or moon. In the early morning, when the sun rises, King Frost is up and away to his fairy palace, and even if you are out early you will find nothing but the traces of his beautiful breath bejeweling wood, and field and rock.

But the snow crystals come at all times. Any morning in winter we may wake up to find the world white and sparkling beneath their covering. Or at noontide the day may grow dark and gray and overcast and the snowflakes begin to strew the earth. Soon common things have lost their outline,

> " Every pine and fir and hemlock
> Wears ermine too dear for an earl,
> And the poorest twig on the elm-tree
> Is ridged inch deep with pearl."

Let us capture one of King Frost's little fairies and look at it through our microscope. It has been a big storm and so we have caught a perfect crystal. The snow crystal will soon escape us and resume its original watery form; how can we get its picture before it goes? Drawing would take too long, but a microscope fixed to our camera, and lo! we have our snow fairy complete. Is it not beautiful?

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THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 2833

THE BEAUTIFUL WORK OF THE HOAR-FROST

Jack Frost is a wonderful artist, and when the flowers and leaves have fallen, and nothing but the bare stalks remain, he can, in a single night, change a bare plant into a thing of beauty, as we see in this picture.

Even the tall, straight reeds that grow by the river blossom with glistening white flowers, equal in their delicate beauty to the flowers of summer. The ice flowers in this picture were formed on rushes growing in a frozen river, and everywhere the hoar-frost—which means simply white frost—had decorated the landscape.

THE FLOWERS IN JACK FROST'S GARDEN

Sometimes whole fields and stretches of country may suddenly become huge beds of white glassy flowers. Here we see a bed of frost flowers on the bank of a frozen river. The crystals of hoar-frost that make up these flowers, if seen through a magnifying glass, look very like the beautiful snow crystals on page 2524.

It is not only upon trees and grass that the hoar-frost takes such pretty forms. This picture looks like a mass of delicate white coral, but it is really a picture of piled-up crystals of hoar-frost, as they were deposited, many inches deep, upon a stone. Any stone lying in the road will look like this after a heavy night frost.

The photographs on these pages are by Prof. R. B. Young, G. R. Ballance, Percy Burton, and G. P. Abraham.

HOW WINTER PAINTS THE WORLD WHITE

A beautiful effect is produced by the deposit of hoar-frost upon bare trees, like the birch shown above. Every branch and twig shines as with gleaming silver.

When the deposit of hoar-frost is heavy, the effect is remarkable, as we see here, but much of the delicate beauty is lost by the massing together of the crystals.

Travelers go to Switzerland in the summer and are delighted with the beauties of that wonderful country. But its glories in winter, though different, are not less delightful than in summer. This picture, showing a home among the Swiss mountains, shows us how beautiful the scenery may be made, even in the colder weather, by the touch of the snow. The houses, trees, and ground all wear their white and glistening mantle.

WHITE PLAYGROUNDS IN THE MOUNTAINS

There is no more exciting sport in countries where snow lies for months at a time than tobogganing. We read about tobogganing on page 2355, and here we see five men winning a toboggan race in Switzerland.

When only one man rides on a toboggan, he lies down full length, like this. The position is not so comfortable as sitting up, but the rider can travel at a very much greater speed in this way.

A delightful sport in the lands of snow is ski-running. Skis, pronounced "shees," are like skates with very long wooden runners.

Very exciting, though dangerous, is ski-racing with horses. The runner holds a rope attached to a horse, and the animal pulls him along at full gallop. It is difficult to keep one's balance, and a fall may be serious.

THE CRASHING OF AN AVALANCHE

Avalanches are a serious danger in the mountains and valleys of Switzerland. These "thunderbolts of snow," as Byron called them, crash down from the mountains, destroying everything in their way, and the fierce wind that they make, by driving the air in front of them, roots up trees and carries away houses. Forests are specially planted on the slopes of the Alps to break the force of avalanches and save the villages, and here we see the end of an avalanche that has broken through a forest, destroying hundreds of trees.

The word avalanche means "to the valley," and in some of the valleys no houses can be built, because these mighty snowballs, many of them weighing more than a ton, are constantly crashing down, filling up the valleys. Sometimes, when the snow is squeezed into ice, it slides down like a mighty land-slide. The least thing will set an avalanche traveling, even the shout of a boy. This picture shows what an Alpine valley looks like after Nature has been playing at snowballs. A falling avalanche makes a roaring noise, terrible to hear.

A glacier is a river of ice which flows down from the mountains until it gets to a warmer climate, where it melts. Although it is always moving, it does not run fast like an ordinary river. It may travel only a foot a day. This picture shows the glacier at Chamounix, Switzerland. In Greenland some glaciers are halt a mile thick and fifty miles wide, and when these flow into the ocean and break up, they discharge fleets of icebergs.

Examples of the great glaciers which once covered much of our country still exist in Alaska. We know this because we can see the scratches and marks made by the traveling ice; and we also find, in different places, great boulders of rock which were carried down by the glaciers and left where the ice melted. In this photograph, taken by Professor Young, we see the track of a glacier that flowed long ago.

THE GREAT WHITE TOPS OF THE WORLD

There is something very wonderful in the sight of the great snow mountains, and hundreds of people go to the Alps every year to climb the snowy heights, as we see them doing here. It is often necessary to wear blue or green spectacles, because the glare of the snow, when the sun shines upon it, injures the eyes.

We do not often think of mountains or snow in connection with Australia, the great flat continent in the sunny south. But there are mountains there, the tops of which are always covered with a mantle of snow, and here we see some travelers struggling up one of the steep white slopes of Western Australia.

THE COLD OLD MAN OF THE SNOW

This is the first Snow Man built by the little reader of the Book of Knowledge who stands beside it. For days he stood in the centre of a lawn, looking terrifying in the moonlight nights. Then the little girl would look at it from her window and almost be afraid of the man she had made. At last the Snow Man melted, disappearing slowly until he was but a speck; and then, as the sun shone upon it, the tiny specks of snow changed into a tear, which sank into the earth as if in mourning for the Snow Man who had passed away.

THE WHITE WAVES THAT DO NOT MOVE

When we speak of waves we usually think of the sea, but there are waves of snow as well as waves of water, and here we see how the wind blows the snow into ridges, or waves, across hilly ground. Travelers lost in the trackless wastes of Siberia have been able to find the way by noticing the direction of the snow-waves.

On the level ground the waves are seen more plainly. Sometimes the snow presents the appearance of a choppy sea; at other times there are gentle ripples all over the surface. It is the newly-fallen snow that is blown into waves, and a curious sight can be seen after a cold night, when the waves formed during the day are frozen hard, and we have the almost unnatural sight of waves that are quite motionless and firm

THE NEXT FAMILIAR THINGS BEGIN ON PAGE 2833.

DOES LIGHT DIE AWAY?

CONTINUED FROM 2475

IF it were the case that light were stopped and made into nothing as it traveled through the ether, half of the things we believe about the sky would have to be given up; but ether does not soak up, or absorb, any of the light it conveys. Of course, light may disappear between a star or a planet and our eyes because it is stopped, not by the ether, but by something material, such as sky dust.

The light of a star will disappear if the star grows cold and "goes out." Any star we see to-night may already have gone out—for the light we see it by left it long ago. Though light may be so steady and seem so permanent, yet we must think of it as we do of an electric current. Light really is a sort of electric current. It has to be made and kept up from moment to moment. To make light you must—or a star must—*spend power;* and if the new power is not forthcoming the light will cease, just as an electric current will cease if the battery runs down. So that light dies away if you do not continue to make it.

HOW FAR CAN LIGHTNING BE SEEN?

We can be sure that lightning can be seen for very many miles. We can judge the distance of a lightning flash by counting the number of seconds between the lightning and the thunder. Probably only the roundness of the earth prevents us from seeing lightning still farther than we do, for, of course, the time comes when the light, as it flashes through the air, will be cut off from the eyes of people far away, because they are, so to say, "round the corner" of the earth. In questions like this we must remember that light can travel to any distance, and will, indeed, travel to infinite distances so long as nothing stops it. Thus, if the light remains bright enough for our eyes to be affected by it, we can see, as we say, to the distance of the thing which is giving out the light. Thus, when we see a star, we see to a distance of billions of miles.

DOES LIGHT GET FAINTER AS IT TRAVELS?

We know that the farther off a bright thing is, the less bright it seems. We know that the little moon, or a planet like Venus, is brighter than the stars to our eyes, though not a ten thousandth part so bright in reality, because it is near. Yet we said in the answer to the last question that light will travel on for ever unless it is stopped. So far as we can judge, light, as it travels through the ether, suffers no loss at all; none of it is absorbed or lost.

Yet we know that, somehow, light gets fainter as it travels. The reason is that the light spreads in all directions as it travels, and so gets less intense at any particular place—as, for instance, where it strikes the curtain, or retina, of our eyes. If you have ever played with a magic lantern, you

know what a bright spot of light it throws when it is placed near the screen, but when it is moved farther away the light gets fainter as it gets wider. The law governing this is known precisely. If the distance is doubled the light is one-fourth as bright; if trebled, one-ninth as bright; if quadrupled, one-sixteenth as bright. To get the intensity, you must take the square of the distance —*i. e.*, multiply it by itself, and then the intensity is so much less. We say that it varies *inversely* as the square of the distance. If it varied *directly*, then the light would be sixteen times as bright when the distance was four times as great, instead of being one-sixteenth as bright. This "law of inverse squares" is true for the intensity of light, sound, magnetism, heat, and gravitation.

WHY DO WE HEAR THINGS MORE PLAINLY BY NIGHT THAN BY DAY?

There are more reasons than one for this. The first is that there are fewer noises at night, and so those we do hear are better and more distinctly heard, since they are not confused with others in the air, and also since they are not confused with others in our ears. A second reason is, I think, that our ears are usually much more sensitive at night, so that we hear things much better. I don't mean of course, that our ears are more sensitive when we are asleep, but that when we are just awakened, or when we are just going off to sleep our ears are specially acute.

The same thing is true of the ears of anyone who is taking chloroform or ether for a surgical operation. Thus, two sounds which, measured by some lifeless machine, are of exactly the same loudness, will sound very different to our ears according to whether we hear them in our ordinary wide-awake state, or at night when we are half asleep, or when we have been suddenly awakened and are straining our ears to hear. This straining is a real thing. We tighten the drums of our ears, so that they vibrate better to sound, and so we actually hear more loudly.

It may also be that in some states the night air may conduct sound-waves better than in the daytime.

HOW CAN PEOPLE FORETELL THE WEATHER?

Though people who foretell the weather are sometimes wrong, and though we usually remember when they are wrong and forget when they are right, yet it is true that people *can* foretell the weather, and that those who do it best are much oftener right than wrong. One way of foretelling the weather is simply by noticing what has happened before, without any attempt to explain why. We all know the lines which say that

A red sky at night is the shepherd's delight,
A red sky in the morning is the shepherd's warning.

These lines express what most of us know by experience. Many people who notice this kind of thing may be more or less weather-wise, though they know nothing at all about what makes the weather; but they will be very often wrong.

The scientific way of foretelling the weather depends on our understanding the causes of it. We know, for instance, that when the air in a place is less dense than usual, which we mean when we say that the atmospheric pressure is low, there is likely to be wind coming in from parts round about to fill the space which is comparatively empty of air; and this wind, if it comes from the direction of the sea, will probably bring rain with it, or if from a colder region, will bring cold. So the barometer, which tells us the pressure of the atmosphere, helps us, at the same time, to foretell the weather.

IS THERE A NAME FOR THE SCIENCE OF THE WEATHER?

We know that the names of sciences often end in -logy, since *logos* is the Greek word for a discourse about anything. Thus, we have such words as *geology*, the study or discourse of the earth; *biology*, the study of life, and so on. We also have the word *meteorology*, for the science of the weather, and there is in our own country a weather bureau, where people study the weather, and from which come the forecasts we see every day in the newspapers.

Of course, the barometer is one of the chief instruments used at this office; but the office is much helped nowadays by the telegraph, and even by ocean cables and wireless telegraphy. By these means we can know in advance what is happening over, say, the Atlantic Ocean, and can foretell the weather because we know that certain changes in the pressure of the air are traveling in our direction. Sometimes we find places in the air where the pressure is high, and lower round

them, or places where the pressure is low, and higher round them, and these cyclones and anticyclones, as they are called, travel over the surface of the earth, and bring changes of weather with them.

WHY DOES A WET PLATE GET DRY IF WE LEAVE IT ALONE?

This is due simply to what we call the *evaporation* of water, and the great fact about this is that it occurs at all temperatures. It is true that on a hot day, or when put before a fire, a plate may get dry much more quickly than otherwise, but water everywhere *evaporates* at all temperatures, though the rate varies according to the amount of water already present in the atmosphere. It is that, and not the temperature, that counts. Sometimes, whatever the temperature, we may find that the wet plate does *not* get dry when we leave it, and even that dry things get damp. Matches will not strike, we find, and writing-paper is quite moist. In such cases the air has been holding more water than it needed, and has deposited it on everything exposed to it. That, of course, is what happens when the dew falls, and if you laid a wet plate on the grass in the evening, you would certainly not find that it became dry, but wetter.

WHY DO ROUGH WAVES BECOME CALM WHEN OIL IS THROWN ON THEM?

We must not think that we can abolish waves altogether by throwing oil upon them. The waves, driven by the wind, will go on as they did before, but it is just the surface of the water, including the waves, that is affected by the oil. The oil is lighter than water, and floats on its surface. Though it is lighter, yet it is a very different kind of liquid, and the molecules making it up are much more closely attached to each other than the molecules of water are. We have a special word for this difference in liquids. We say that some are more *mobile* than others, which simply means that they are more movable; and we say that some are more *viscous* than others, which simply means that they are more sticky. Water is very mobile, though not quite so mobile as some liquids, such as "sulphuric ether," which is used for sending people to sleep; and oil, on the other hand, is very viscous. A mobile liquid, when it is shaken, readily breaks into drops, and so forms spray; but you can scarcely make a spray of oil, whatever you do to it. So, by pouring a layer of the very viscous liquid oil on the mobile liquid water, we stop the spray, though we do not stop the waves, and we prevent the waves breaking, as they would otherwise do, against the sides of the ship. This may be well worth while, as it may mean that only a very little water, or none at all, is brought aboard, where, before, every wave was breaking and threatening to waterlog the ship.

WHEN WATER IS PUT ON AN OILY PLATE, WHAT CAUSES IT TO GO INTO BEADS?

We all know that water and oil will not mix together. The reason for this is that the molecules of the water, and the molecules of the oil, hold very much more firmly to each other than they do to molecules of the other kind. This holding together is very weak, comparatively, in the case of a mobile fluid like water, and so, when it has a chance, it flows very easily and widely over any surface that it may be upon. But if the surface happens to be covered with oil, the water cannot do this. Perhaps it might if water were lighter than oil, but it is heavier, and so everywhere the oil tends to rise above the water, and breaks it up into a number of little drops or beads, which cannot spread themselves out, because they cannot break through the ring of oil molecules which surrounds them, holding each other's hands very tightly, as it were.

WHY DO OUR FACES KEEP WARM WITHOUT CLOTHES?

The answer to this very interesting question is that it is all a matter of custom. Our faces, exposed to cold, *do* get cold, as we could show at once by placing what is called a "surface thermometer" on them; but they do not feel cold, because the nerves by which we feel cold are accustomed to this state of things, and take no notice of it. It is true of all nerves that they only notice differences from what they are accustomed to. We tolerate, without noticing them, degrees of cold to which we are accustomed in our face and hands; but we feel our feet cold, and may even "catch cold," if we expose them. But people who are accustomed to bare feet feel no more, and suffer no more, from them than we do from bare hands. On a winter day we may not notice that our

noses and ear-tips are cold, but they *are* cold, though we feel nothing. You soon find that, if you put a warm hand against them; and the other proof is that they are very apt to get frost-bitten in cold climates. There is all the difference between *being* cold and *feeling* cold.

This law about custom, and the way in which nerves are affected by it, is one of the most important in the world, for it explains the way in which we learn to get accustomed to all manner of things, and it tells us why the countryman cannot at first sleep in the city on account of the noise, while the townsman often cannot sleep in the country on account of the silence. At last, however, the countryman gets used to the noise, and the townsman gets used to the silence, and both sleep soundly and well. All we really feel is *difference*.

How did the gas get into the coal?

When we look at a dry, firm lump of coal, it does not look as if it contained any gas, for there are no visible spaces for the gas to be in; nor does it look at all oily. These things do not exist in the coal before something is done to it. We say that coal is mainly made of carbon, but a great deal of this carbon is combined in it with other elements, such as hydrogen. Coke is much more nearly pure carbon than coal is. When coal is heated it is greatly changed, partly by the heat and partly by its being burned, and then the gases are *made* which we can separate and burn, and which give its cheerful flames to an ordinary coal fire.

What is it that makes coal burn?

Coal burns, as other things do, by combining with oxygen. In order to do this, it must be hot; and so we have to make it hot before it will burn. But when once it has started to burn, it produces so much heat and makes itself so hot that it will go on burning. A single piece of coal that has fallen out of the grate will not go on burning. It is exposed to the cool air on all sides, and loses the heat it makes so quickly that it soon falls below the temperature at which the burnable things in coal will combine with oxygen, and so after a time it grows dark and stops burning. Coal will only burn in an ordinary fire, because the lumps lie close together and keep each other warm enough.

The burnable things in coal are very numerous and we do not know nearly all of them. If we consider that coal is the remains of living creatures, and if we remember how infinitely complicated is the chemistry of living creatures, we shall understand how complicated the chemistry of coal must be. But at any rate we know thoroughly one part of its chemistry, and that is that practically only two elements are responsible for the burning of coal and for the making of the endless compounds which it contains; the elements are known as carbon and hydrogen.

What are ashes made of?

We know that, however thoroughly we burn a piece of coal, and however good the coal is, there is a certain proportion of it which will not burn, but drops to the bottom of the fire, and has to be raked out afterwards. We throw these ashes away and think of them as useless. But they contain all sorts of very valuable salts. We have heard of potash, a compound of the element which was found a century ago and called *potassium*. Well, potash is really pot-ashes, and this tells us something about the composition of ashes. The plant body from which coal is made contains many salts, just as our own bodies do, and these salts—salts of potassium and other metals, such as *sodium*—are already burned, or oxidized. That is why they cannot be burned any more in the fire, and fall to the bottom, instead of going up the chimney in the form of gases. These ashes are really very valuable as food for plants, or manure, for they contain the very salts that present-day plants need for their lives, and must get from the ground if they are to live.

If our own bodies were burned we should find ashes left, just as when coal is burned, and these ashes would be very similar in most ways to the coal-ashes.

What is the use of coal-tar?

Besides gas and ashes, we can get out of coal the stuff we call tar or coal-tar, and this has all sorts of remarkable uses. It is one of the most complicated things in the world, outside the realm of living things, and it is so, just because it is really the product of living things of long ago. Nothing could be uglier or less

interesting to look at, yet it is the source of some of the most exquisite colors in the world. All sorts of beautiful dyes, used for clothes and many other things, such as painting, are made from coal-tar. The great discovery of the first of these, called mauve, and of many more, was made by an Englishman named Perkin, who died some time ago. But science has never been properly studied or appreciated in England, and so now we get nearly all our coal-tar dyes from Germany, where Perkin's work has been carried much further.

But we get still more useful things from coal-tar, for it contains substances which can be made into all sorts of medicines, and especially such things as carbolic acid, which kills microbes, and has already saved millions of human lives since its use was discovered by Lord Lister. Indeed, it would be quite easy to write a book about coal-tar, which is now known as one of the most valuable things in the world, though until last century it was looked upon as little more than mere worthless waste.

WHAT IS A CONSTELLATION?

Stella is Latin for a star—as every little girl named Stella knows very well, of course—and *con* simply means with or together. So the constellations are the groups or families of stars that we seem to see in various parts of the sky. I say "seem to see," for as a rule there is no reason to think that the stars which seem so near together are really near at all. Of two stars seen side by side, one may be a hundred times as far away as the other. But these groups of stars or constellations, like what we now call the Dipper, are even more impressive and noteworthy than any single star; and so, in many cases, the names of the constellations may be older even than the names of the stars which go to make them up.

But there is one very special reason why the constellations have been studied and watched by men for countless ages. It is because they thought that the constellations all had special meanings for the lives and happiness of men. The same was thought of the planets. So when a certain planet seemed to be passing or wandering—you remember that planet means wanderer—through a certain constellation at the exact time when a child was born, it was thought that, all its life, the child would be affected by the planet. One thing—perhaps something nice—would happen when this particular planet was passing through one constellation, and another thing—perhaps even a great risk of death or injury—would happen when the planet was in another constellation. We now know that all this is false, and the very worst kind of lies; for it led people to trust and believe in things that had nothing to do with them, instead of remembering that God rules all, and that the way to be happy is to do the right and leave the rest to Him.

HOW DO WE KNOW THAT THE EARTH IS IN MOTION?

Not long ago there was found a new way of showing that the earth is in motion—by setting something spinning, like a top, and showing that it seems to change the direction of its spin in a way which can only mean that the earth on which it spins is itself spinning. But it was known that the earth is in motion long before this way of showing it was found. We know that the earth is moving just as we know that the smoothest train is moving—by the fact that other things beside it seem to move. In the case of the train these other things are the telegraph-poles, fields and fences; in the case of the earth the other things are the sun and moon and stars, and even comets, when there are comets to be seen. All the heavenly bodies, without exception, seem to rise in the east, move over the face of the sky, as we say, and set in the west. It is quite impossible that this can mean anything else but that the earth is spinning towards the sun, moon, and stars as they seem to rise, and spinning round away from them as they seem to set.

DO ALL THINGS MOVE IN SPACE?

Of course, the sun and the moon, and even, as we now know, what used to be called the "fixed stars," have motions of their own—their *proper* motions, as they are called, proper really meaning "belonging to"; but the motion which proves that the earth is moving is called their *apparent* motion, for it only seems or appears. The earth is moving, and not they. The marks of this motion are that it is *common* to *all* the heavenly

bodies, though their own or proper motions may all be quite different from each other; and that it is daily, or *diurnal*, which is Latin for daily. The best proof of the earth's motion, then, is the *common, apparent, diurnal* motion of the heavenly bodies, which can only mean that the earth spins right round on itself once a day; just as the best proof of a train's motion is the *common, apparent* motion of everything on both sides of it — common, or shared in by all objects, even though these may include cows or horses running in opposite directions to each other. That, of course, is their own or *proper* motion. Everything moves.

WHAT MAKES BRASS WARM WHEN WE RUB IT AGAINST WOOD?

The Latin name for rubbing is friction, and by that word we now mean everything that happens when one thing is rubbed against another. There may be friction between the outside of one thing and the inside of another; or inside something, as when water is shaken and the molecules rub against one another. If we prevent the heat of the water leaking away, we can actually make cold water boil simply by stirring it.

Now, heat is really a special kind of motion — a special motion of the atoms or molecules of any kind of matter. If we remember this, the rest is easy to understand. For nothing is commoner or simpler than the change of one kind of motion into another. Whenever you throw a ball, the motion of the fibres of your muscles, as they shorten, is changed into the motion of the ball. When steam drives an engine, the motion of the molecules of the hot steam is converted into the motion of the wheels — while the steam loses its heat.

And just as heat can be converted into the visible motion of an engine, so visible motion of any kind can be converted into the special kind of motion called heat, which is exactly what happens when we rub brass against wood. The point is that nothing comes from nothing; if the motion we call heat appears, then the visible motion of the rubbing must disappear. And the harder you rub, the greater the heat. If there is no friction, or very little, as when something slides very smoothly on glass or ice, you will get no heat, or very little, *just because* you lose no visible motion, or very little. That is to say, the whole of your energy or nearly the whole of it, is changed into visible motion, so that none is left to make heat. Exactly in so far as the wood stops the motion of the brass, so far do the brass, and the wood, get hot.

WHERE DOES A COLD COME FROM, AND WHERE DOES IT GO?

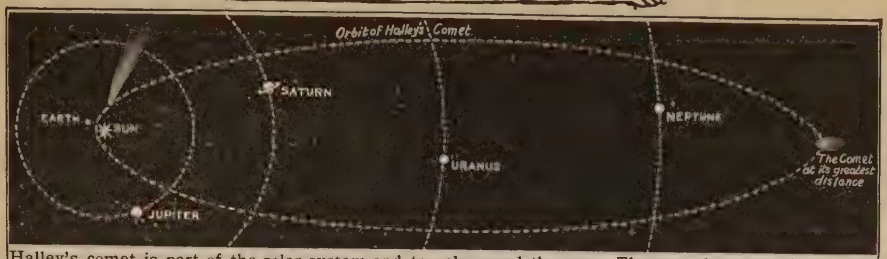
A cold is due to microbes that attack our nose and throat, and in bad colds even our upper air-passages. The microbes probably come from someone else who has a cold almost in every case. We do not know whether the cold-microbe lives anywhere except in the throats and noses of human beings. If it does, perhaps a cold may come from the soil, or wherever it is that the microbe lives; but usually the answer to the first half of the question is that the cold comes from someone else. Unfortunately, he is none the better for having given it to you. The answer to the second half of the question is that, so far as we are concerned, the cold ends because, after a few days, our bodies learn how to deal with the microbes, so that they are either killed, or else can do us no further harm, and so we recover. But the cold may often go to other people, just as it came to us.

HOW DO WE GIVE ONE ANOTHER COLDS?

We give one another colds in many ways, the result of all of them being that we pass our cold-microbes on to others. I do not think, added the Wise Man, that people are nearly careful enough about safeguarding other people when they have colds. Doubtless the other people are just as careless as the person who has the cold; but, at least, if we do not keep ourselves away from company, we should be careful about not coughing or sneezing or even speaking opposite the faces of other people else we may give them our cold.

Also, the time will probably come when people who have colds, and diseases a thousand times more serious than any cold, will not be allowed to send handkerchiefs to the laundry, where now women daily catch all sorts of diseases from the clothes they wash, which have come from many different homes where there are sickness and disease.

THE NEXT QUESTIONS BEGIN ON PAGE 2651.



Halley's comet is part of the solar system and travels round the sun. The sun, however, is not the centre of this comet's path, but is at one end, as shown here. The comet comes within our sight about every seventy-five years, and then rushes away till it is 3,200 millions of miles from the sun.

COMETS, METEORS, & SKY DUST

CONTINUED FROM 2394

MOST people have got into the way of thinking that space is quite empty between the stars, and that the solar system is quite empty between the planets; and so we speak of "empty space." We do not, of course, mean really empty, but we mean empty of everything but the ether, which is everywhere. But now we are beginning to learn that space is by no means so thinly inhabited as we used to think.

It is probable that if we could travel from the earth to Mars we should find ourselves almost constantly encountering matter of one kind and another, and so, in order to complete our study of the solar system, we must take into account various things which are part of it, but which are very different from either the sun, or the planets, or the moons of the planets. The most remarkable are the comets. After studying them we must learn about the meteors, and also about the dusty stuff which exists in space, and is usually known to astronomers as cosmic dust. But the great point we are to be certain of, from the first, is that these different things are not quite independent of each other, but that if we could trace the history of a speck of matter from age to age we should probably find it at one time making part of a comet, at another time part of a meteor, and perhaps, last of all, as part of the cosmic dust or sky dust, about which astronomers are just beginning to learn.

Let us now begin with the comets. It is generally supposed that there are two classes of comets—those which go regularly round the sun, just as we do, and those which visit the sun, apparently once only, and then fly away for ever into the depths of space from which they came. We may possibly learn soon, however, that in reality even these last comets will return; and all we can say at present is that the more we study the comets, the more likely does it appear that all the comets we can see will some day be proved to be parts of the solar system, going round the sun as the earth does.

When we look at an ordinary comet, we may perhaps see only something bright, which might, for all we know, be simply a star. But if the comet is large and very near, or if we look at it through a telescope, we see at once that it is not a star. There is no mistaking it for anything but what it is, for no planet or star or moon or nebula has the same appearance.

The pictures on page 2545 show us that a comet has three parts; it has a head with a very bright spot in the centre, and around it a sort of cloud which perhaps looks a little like glowing hair. The word comet is derived from the Greek word *kome*, which means hair. The central and brightest part of the comet is called the nucleus—a word which we may remember because it is also the name for the central part of a living cell.

A comet always has a nucleus with the misty stuff round it, and there is no doubt that this stuff is given out from the nucleus, which is a very hot and very active place—at any rate, when the comet is near the sun.

The thing we always think of, however, in connection with a comet is its tail; and it is true that most comets, when we can see them, have tails. The tail may be long or short; it may be a single tail, or it may break up into a sort of brush. If we watch a comet that has several tails, we may find them changing very much, almost from day to day; sometimes they may disappear, and then after a while new tails, or a new tail, will form.

How the sun drives the comet's tail out of its head

We are at last beginning to understand what the tail of a comet is. It is best thought of as a streamer, or a number of streamers, flowing out from a head; and we shall have the key to the making of the comet's tail if we study its history in the various stages of a comet's course. The rule is that when a comet is far from the sun it has no tail. The path of a comet round the sun is much more elliptical—like this ⬭—than that of any planet, and at its farthest from the sun the comet goes out far beyond Neptune. Suppose, now, that we on the earth are watching a comet coming back towards the sun after its long journey into the cold. We know it for a comet by the appearance of its head and by its movement, and perhaps by the fact that it was expected. But when we first see it, it has no tail; then gradually, as it approaches the sun, a tail streams out behind it, and the nearer it is to the sun the bigger is the tail. At last the time comes when the comet has to go round the sun, and then it will begin to go back to the depths of the space from which it has come. At this time it is moving very quickly, for if it were not the sun would certainly capture it altogether by the force of gravitation.

The comet leaves the sun like a lady leaving royalty

And now we notice that the tail of the comet, which streamed behind it as it approached the sun, is always seen on the side of the comet away from the sun; and as the comet leaves the sun, the tail is now the leading part of the comet. The comet leaves the sun like a lady leaving the presence of Royalty—the train of her dress going first, and then the lady herself.

Now, all this plainly means that the tail is something which is pushed out from the head of the comet by the sun, so that, wherever the comet is in relation to the sun, whether it is going towards the sun or away from the sun, the part of the comet next the sun is always the head, and the part of the comet farthest from the sun is always the tail. There is some power in the sun which is able to repel part of the comet when the comet comes near enough. That part which is repelled or pushed back from a comet's head by the sun is the tail. That is why the tail only appears when the comet is near the sun, and that is why the tail behaves in the peculiar way it does.

We are to think of a comet's tail as made under the action of two forces. First, there is the nucleus of the comet which is throwing light stuff out from itself. If the comet is far from the sun, that stuff is made very slowly, and simply surrounds the nucleus, forming a sort of fog or hair, which gives the comet its name.

How the comet loses its tail and how a new one comes

But when the comet is near the sun, a second force comes into play, and the matter which is thrown out from the nucleus is now pushed by the sun, always on to the side of the comet farthest from the sun. There was discovered in America in 1908 a very fine comet, which was very carefully photographed again and again at Greenwich, and these photographs have shown more clearly than ever before the truth of what has just been said about a comet's tail. A specially interesting point is that the nucleus of a comet is not equally active at all times, but undergoes changes, just as volcanoes do, and just as the history of sun-spots shows us that the sun himself does. It may even be that the nucleus of a comet becomes regularly more and less active owing to a *cycle* of changes—we now know what that word means—going on inside it. Thus the appearance of a comet may change from day to day or week to week, and as it is certain that a comet's tail may sometimes get broken off, and scattered into space, days may pass during which the comet seems to have lost its tail, because,

perhaps, just then the nucleus is not throwing off much new matter. And then a new tail will "grow," that is to say, the nucleus begins to explode again, and the repelling power of the sun drives the exploded stuff out into a streamer, which we call the comet's tail.

Now, we have heard again and again of the attractive force of the sun, which we call gravitation, and suddenly we are told that the sun has a repelling force—something which acts in exactly the opposite direction to its force of attraction. I am sure that if you are thinking carefully you will say that there has been some mistake, or if there has been no mistake there is, at any rate, something which needs to be explained. Now, it has lately been shown that light, as it flies out from anywhere, has a pushing power, and it is possible, by a very delicate experiment, to show that a flash of light will push down one end of a balance. Not only light, but other kinds of rays, such as heat rays, have this power of pushing or pressing, and so it is called "radiation pressure." It is this light-pressure, or radiation pressure, that makes the tails of comets, and explains why the tail appears when the comet gets near the sun, and why it is always on the side away from the sun. We believe that it is the very lightest atoms in the comet that are pressed or blown away by the light from the sun. We need not say more about that here, but I particularly want you to remember that sometimes the matter which is blown out from a comet's head may break away from the comet altogether. This has long been suspected, but I do not think that it had been proved until the photographs were taken at Greenwich in 1908, which showed that it actually happens. *We shall hear again of these broken-off pieces.*

When a comet first comes within sight of the earth it appears as a patch of light. Then, as it gets nearer to the sun, it begins to have a tail, or stream of light, which is always turned away from the sun. This picture shows a comet traveling round the sun, and we can see how it appears at different stages of its journey. As it goes away from the sun it pushes its train backwards, like a lady leaving the presence of Royalty.

By far the most famous of all comets is one which is known by the name of the great astronomer Halley. A comet had been seen by Kepler in 1607, and a comet which Halley saw in 1682 seemed to be in the some position. Halley argued that it must be the same comet, traveling round the sun once in every seventy-five years, and he proved his case. This was the first time that this revolution round the sun was proved for any comet. He found that just about

seventy-five years before 1607, a comet had been seen, and seventy-five years before that — in 1456 — a comet had been seen which had terrified the world — terrified it so much that the pope ordered prayers to be offered for protection against it. This same comet returned in 1910, but was a great disappointment for it was so small and so insignificant that even the most ignorant and superstitious were not in the least frightened by it.

Halley predicted that the comet would return again about 1758. Later it was calculated that Jupiter and Saturn, by their gravitation, would slightly delay the comet, so that it was expected in 1759, and it came in that year. So it did in 1835. Now, seventy-five years from 1835 brings us to 1910.

Great interest was manifested on its approach. Astronomers all over the world had their telescopes ready to take photographs of the rare visitor. All were anxious to be the first to discover its coming, and astronomers hoped to be able to discover more of its composition than could be found out by the crude instruments which had been in use seventy-five years previously. As has been explained to you elsewhere, we can tell by a ray of light what elements are present.

THE COMET SEEN AT THE NORMAN CONQUEST WHICH WAS SEEN AGAIN

We need not be told that, since the year 1835, the science of astronomy has advanced enormously. We were able to learn things about Halley's comet, when it returned, which Kepler or Halley or the astronomers in 1835 would never have thought possible. We were able, for instance, to learn a great deal about the very chemical elements of which the comet is made.

We have already learned that a comet may lose part of itself, and, indeed, it is probable that the life of comets, so to speak, is not nearly so long as the life of a star or even a planet. They are apt to break up. When Halley's comet was last seen, it was very much smaller than it had been before, and it was smaller still this time. There is a famous tapestry, called the Bayeux tapestry, which shows the comet as it appeared in the year 1066, the year of the Norman Conquest. I think we may be sure from that tapestry that the comet was then even larger than it was when it frightened the world nearly 400 years later.

THE STORY OF MANKIND IS NOT YET AS LONG AS A COMET'S YEAR

To judge by the length of our litttle lives, seventy-five years is a very long time, but there can be no doubt that there are many comets which have a far longer period, as it is called, than this. There are comets which only return to the neighborhood of the sun in thousands or even hundreds of thousands of years — that is to say, their year is as long as hundreds of thousands of our years.

Now, recorded human history only goes back for about 10,000 years and the real length of the life of mankind upon the earth cannot yet be as much as 500,000 years. So the path of these comets gives us a new kind of scale by which to measure time, and makes our little "history periods" seem very short. We might think at first that, surely if a comet travels out so far from the sun as these tremendous periods of time suggest, it must encounter another star, and come under the influence of its gravitation. But the sun and the solar system are very much alone in space. The nearest fixed star is 20 millions of millions of miles away, and so there is plenty of room, so to speak, for a comet to travel out tremendous distances without getting within reach of any power that can draw it away from the sun for ever.

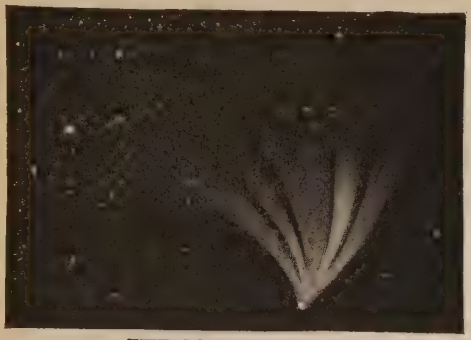
IF A COMET'S TAIL SHOULD STRIKE AGAINST THE EARTH

We may also ask whether the life of a comet can last long enough for these periods, as we know that comets are apt to break up. But it is probable that their breaking up largely depends upon light-pressure and upon the sun's heat, which only act when they are comparatively near to the sun, and therefore, of course, when comparatively near to us. When the comet is pursuing its path far away in space, there is probably no reason at all why it should break up.

It has been supposed that a comet, or the tail of a comet, might strike the earth, and that if this happened the earth might be destroyed. But there is reason to believe that the tail of a comet

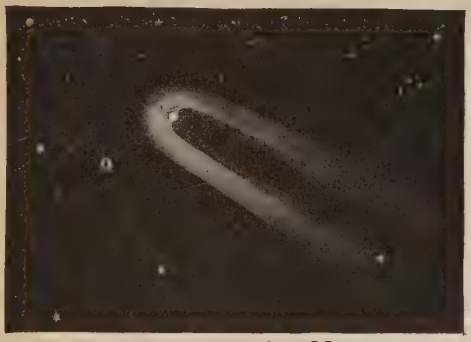
has touched the earth without anything terrible happening. The truth is that the tail of a comet is made of such very fine and rare stuff that it can do no harm. One proof of the rareness of a comet's tail is that the stars can quite plainly be seen through it. But it may be that the stuff in a comet's tail may condense, when it has broken off from the comet and is becoming cold. At any rate, we are not to think of a comet as a solid thing, but as made up of tiny parts, and largely consisting of gases. Up to the present the study of the light coming from comets shows us that they contain carbon and hydrogen, probably in the form of compounds belonging to the class of hydro-carbons, which we have already studied, and of which marsh-gas is an instance. It is probable that the things we see going on in the head of a comet when it is near the sun are due to the comet being heated by the sun, and gases being thus made to come out of the nucleus; then the pressure of light acts on them and produces the comet's tail.

Now we must go on to the study of meteors, but we shall find that we have not really left the subject of comets after all. The ordinary name for meteors or meteorites is shooting stars. Of course, we must get out of our heads once and for all anything that the word "star" suggests to us in this phrase. I have known a young child to be terribly frightened by supposing that a meteor was a falling star which had suddenly shot out of its place in the sky and was going to strike and destroy the earth. A so-called falling star or shooting star is no more a star than a bit of coal is. But the name tells us that long ago meteors were thought to be stars; but that was when no one guessed that the stars are suns, nor was it known then that the little lumps of iron sometimes found in the ground are all that is left of meteors. Meteors fall in greater numbers at special times of the year, and also in special years. On some nights in November in certain years we may see hundreds falling. We must remember also that they are

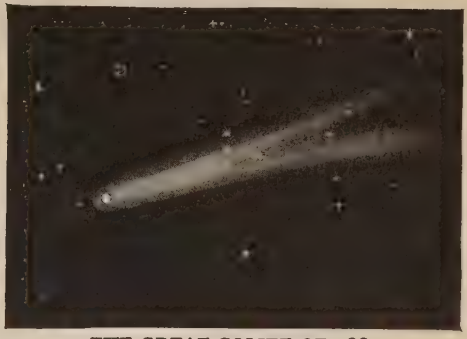


THE COMET OF 1744

THE COMET OF 1858



THE COMET OF 1861



THE GREAT COMET OF 1882

The brightest and biggest comets can be seen plainly without the aid of a telescope. Here are pictures of four important ones, from which we see that they vary greatly in shape. Their tails and streamers change from time to time, getting bigger as they approach the sun, and smaller as they travel from it. The tails of some comets are a hundred million miles long, greater than the distance from the earth to the sun.

falling all the time, more or less, only, of course, we do not notice them in the daytime any more than we notice the stars themselves.

It is only about a hundred years since we have known what meteors are. The space between the planets and the solar system is largely filled with large and small portions of matter. The earth with its atmosphere as it travels acts like a sort of tremendous attractive filter, pulling many of these things towards itself and catching them. Until they meet the earth's air they are cold and invisible, but when they rush through the air—perhaps at the rate of thirty or forty miles a second—they are made intensely hot and brilliant, especially as the oxygen of the air begins to burn them.

This great meteorite, weighing nearly 1,400 pounds, fell from the sky upon the Alps, and after being used as a seat in a church porch was taken to the Paris Museum. It is called the Caille aerolite, and is one of the largest of the known meteors.

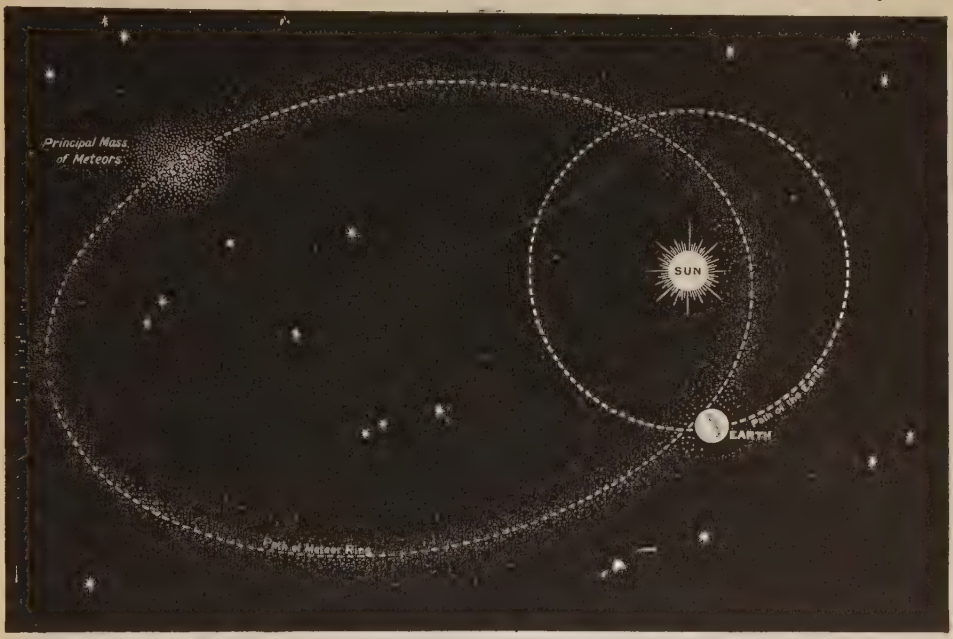
In this way, by far the greater number of meteors are turned into gas; and so, though the matter in them remains as part of our atmosphere, they never strike the solid or liquid surface of the earth at all. What we usually see is the streak of light produced for a moment as the little speck of stuff plunges into the upper regions of the air and is burnt away. Sometimes the track remains bright for a little while, and we suppose that the meteor sheds part of itself as it flies, and that the stuff which was shed glows for a second after the meteor itself has passed.

But not a few times every year the earth catches a meteor so big that it is not all burnt away before it reaches the ground. It is recorded that once a man was killed by the fall of such a meteor. These meteors are to be seen in museums, and, if we consider where they have come from, they are surely very interesting. They are not made of anything new and different from what we find on the earth, but of elements which we know well. Of these the commonest is iron. Probably before they fell they had a good deal of carbon in them, but that has been burnt away as they rushed through the air. The surface of a meteor usually shows signs of having been melted. That, of course, we should expect.

Now let us consider the showers of meteors that we see at regular times. The November shower, for instance, is specially brilliant, and the numbers are specially large, not only in November as distinguished from the rest of the year, but also in certain Novembers, just about thirty-three years apart. We have records of these great showers occurring about three times in a century for a long time back. The earliest record dates from just the end of the sixth century A.D. We have now learnt that these meteors are traveling in a path round the sun, just as the earth is, but that is not all. There is a comet which travels in the same path. Other shoals of meteors travel round the sun, and comets also in the same paths. We have even some evidence that in the path where a comet once traveled there is now no comet left at all, but only a shoal of meteors. What we now believe is "that the countless thousands of comets which in time past have coursed around the sun have left behind minute fragments of their mass, which follow in their orbits like stragglers from an army, and that, when the earth encounters a swarm of these fragments, a meteoric shower is produced." These words are quoted from one of the greatest authorities on the subject. Since they were written, a few years ago, our proofs are increasing, and if you remember what was said about the principal comet of 1908, you will see how interested astronomers must be to learn that the tail of a comet may be broken off. We know now what is going to happen to that tail. Almost certainly it is going to condense into a shoal of meteorites, and perhaps some of these may some day be caught by the earth.

We may ask how it is that the November shower, for instance, returns more

or less every November, but especially every thirty-third or thirty-fourth November. The diagram on this page helps to explain that. It shows us the path of the meteors, and we see that it is like a comet's path. Once a year, plainly, as, for instance, every November, the earth crosses this path and catches a few meteors. But once in thirty-three years it catches a great many. The reason must be that when the comet broke up, or when part of it broke up, and the meteors were formed, most of them



Those bright flashes across the sky that we call shooting stars are not stars. They are believed to be pieces of a broken-up comet, and they travel round the sun in a regular path. This diagram shows how the earth every year crosses the path of the meteors, and as the meteors rush through our atmosphere they become white-hot, and look like shooting stars. Where the head of the comet used to be, there are more meteors than elsewhere, and when the earth crosses this part of the meteors' path we see more meteors than usual.

stayed together in a sort of group, but some would, perhaps, move a little faster, and others a little slower, moving in the same path, but more sparsely scattered. The great shower is when the earth crosses the meteors' path just at the time when the great body of meteors is passing.

Though falling "stars" are utterly tiny compared with a real star, or even compared with a little body like the moon, yet they may be the size of a big cannon-ball, or even, perhaps, a quite large piece of rock. It is probable, however, that space contains a great quantity of stuff made up of much smaller pieces, more like the dust we see in the air when a sunbeam strikes across a room. Cosmos is the Greek word for the universe, and so this stuff is usually called cosmic dust, but if that word is, perhaps, rather difficult, we may just as well call it sky dust. Some sky dust, like meteors, is, perhaps, the remains of comets, but not nearly all of it can have this origin—there is far too much of it. The earth catches certain quantities of it always as it travels—the earth filters some of the sky dust out of the ether, we may say. We know very little yet about the history of this stuff. We may suppose that it was, so to say, left over when the planets were being made out of our nebula long ago. But we know so little about it yet that we need say no more about it here.

Now we have finished our story of the solar system. We began with the sun, and we have ended with dust. After this we must turn to the real stars, about which we have already learned the greatest fact, namely, that they are suns and have systems of planets like our own revolving about them.

THE NEXT PART OF THIS IS ON PAGE 2637.

GERMAN HOMES OF LONG AGO

This picture shows what a German village was like two thousand years ago. The people of those times often built their homes on wooden platforms in the middle of lakes, so that enemies could not reach them easily.

The Germans first appeared in history as great warriors and huntsmen, and to make themselves look fierce they decorated their heads with the heads and horns of wild animals. Here we are looking inside a German home of long ago, and we see the men of the family arriving home with a bear. The boy standing up is dressed in an animal's skin. Rough as they were, the German tribes treated their women with great honor.

THE BEGINNINGS OF GERMANY

CONTINUED FROM 2426

WHEN we read of Germany, in the early annals of the Roman Empire, it was inhabited by a number of restless, warlike tribes whom the Celts, and after them the Roman writers, named Germans. They could scarcely be called nomadic, for they cultivated a little of the land, though they lived chiefly on milk and flesh; but they had an unconquerable love of fighting. They had come, probably centuries before,—we cannot tell how few or how many,—from the east, and made their way up the Danube, to the plains in the heart of Europe, pushing the Celts before them as they moved forward on their journey to the west.

The chiefs of their tribes, they thought, were descended from the gods and heroes, and they believed that when they died they joined the heroes in Valhalla, the abode of the gods, where they spent their days in hunting and fighting and their nights in feasting and story-telling.

Round each chief gathered a band of young men—youths who were sworn to his service, and fought in the vanguard of his battles. The members of this band of youths, which was called the comitatus, as they gained in years, grew to be the most trusted counselors of the chiefs. They were called *thegns* in England when the Angles and Saxons founded a nation there.

When the Romans first met the German tribes they went to battle wearing on their heads the heads of animals, which they afterward changed to helmets; and sheltered themselves from their foes behind tall shields.

They were, of course, pagans when they met the Romans. They worshipped, among other gods, Odin, the father of the gods, and Thor, the god of war, to whom they sacrificed horses and captives taken in war. They worshipped their gods in forests, and under trees, and when they ceased to follow these false gods, and became Christians, they felled the sacred oaks.

Now the country over which the German families had spread, when we first hear of them, is the very heart of Europe, that great middle part which stretches from the Alps to the North and Baltic Seas. A relief map shows us plainly what a sharp contrast exists—not unlike that in France.

Mountains and highlands towards the south gradually slope to the sea on the north, so that a vast plain is formed, well watered by rivers that rise in the heights of Switzerland and Bohemia and flow to the northern seas. On the eastern side of the

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continent were ever constant changes, as other families of nations pressed on from Asia behind, nations of a different stock from the Teutons or Germans. One branch of these is called "Slaves," or "Slavs." In their own language the word means "glorious," but in other tongues it has come to have a very different meaning, because so many men of the race became bondmen.

It was along the Rhine, that great waterway of Europe, that the Romans chiefly came in touch with the German tribes. Julius Cæsar crossed and recrossed it many times when governor of the neighboring country of Gaul. For years the strong nation of Roman soldiers and builders pushed steadily up the long Rhine valley, where the remains of fine cities and forts, splendid roads, and personal belongings exist, as they do in France and England, to this day. They tried to conquer the wild German tribes around, but did not succeed as well as in Gaul and Britain.

HERMANN, WHO TURNED BACK THE ROMAN LEGIONS ON THE BANKS OF THE RHINE

On the top of a hill in the great north plain, about a hundred miles from the Rhine, there stands now a huge statue, over fifty feet high, put up in memory of one of the first German heroes, Hermann, who, in the autumn days of the year 9 A.D., in this neighborhood successfully resisted the dreaded Roman army. When the news of its destruction in the woods and marshes reached the great Emperor Augustus, he clothed himself in mourning and cried out bitterly again and again: "Give me back my legions."

Englishmen take pride in Hermann's stand for freedom, for they trace his bold spirit in the barons who wrung the great charter from John at Runnymede, and in the leaders who defied the tyranny of the Stuarts. For it was from the very region defended by Hermann—in the lands about the rivers Ems, Weser, and Elbe—that their ancestors came later, to found their new Angle-land across the North Sea.

During those centuries the various tribes and families surged like the waves of the sea—a very restless, stormy sea, too—over the face of the land, changing their dwelling-places, fighting with each other and their neighbors, and all these years the great Roman Empire, for a time the ruler of the world, was gradually getting weaker and weaker and less able to hold her own against the on-coming tribes. We remember how the Roman soldiers had to be called home from Britain, then from Gaul. It was a tribe of German stock, the Goths, who appeared at last under the very walls of the great city of the Cæsars, and who finally carried off its treasures, and destroyed many buildings.

ATTILA AND HIS TERRIBLE HOST, WHO SWEPT ACROSS THE RHINE

The Goths had been pushed on by a terrible host from Asia—the Huns. Yellow of face, with wiry hair, and eyes like slits, they seemed horribly ugly to the German races, who saw them sweep across South Germany into Gaul on their swift horses, devastating the country on their way. They crossed the Rhine, and were then stopped on the plain of Chalons, by the River Marne, where the German tribes of the Franks, West Goths, and Burgundians all joined together with the Romans to resist them in furious battle. The "Scourge of God," as Attila, the fierce leader of the Huns, was called, was defeated and died soon after. His terrible host departed back into the darkness whence they had come.

We have already seen how the Franks pushed into Gaul, and with the Celts, who inhabited the country first, laid the foundations of the kingdom of France. We have seen, too, how other German tribes, the Angles and part of the Saxons, took ship to Britain. The East and West Goths went to Italy and the south of France; and another tribe, the Longobards, or Lombards, settled in the plain of the north of Italy.

THE NEW INFLUENCE THAT CAME INTO THE WORLD FROM ROME

About these times of great changes there came, in the place of the old force of the arms and grandeur of Rome, a new influence from the same city. It was the spread of the Christian Faith. We know how it spread to England and to France. Missionaries also went bravely and devotedly to work in the wilds of Central Europe, men who were not afraid to pitch idols into the nearest lake, or to chop down sacred trees with their own hands, while the wild heathens stood looking on. Many of these mission-

THE MEN WHO BROKE THE ROMAN POWER

Hermann, who is better known to us by his Latin name of Arminius, is one of the great national heroes of Germany. He defeated the Romans and delivered his country from their rule. Here we see him presenting to the priests of his tribe spoil captured in war. Hermann afterwards was killed by his own people.

The Goths, who were a tribe of German stock, swooped down from their forest homes upon Rome, but later they were followed by still more terrible invaders, the Huns. As these cruel warriors rushed across Europe they burned and destroyed everything before them. This picture shows us the Huns pillaging a villa.

The top picture, which is in Hildesheim Town Hall, is reproduced by permission of the artist, Professor Hermann Prel, and the lower picture, by Georges Rochegrosse, is reproduced by permission of Messrs. Braun, Clement & Co.

aries were eloquent Irishmen, but it was Rome, hitherto famed for the power of the Cæsars, that was now gaining a new power and greatness as the seat of the Bishop of Rome, the Father of the whole Church, called the pope. Bishops and clergy passed out of Italy over the Alps and the mountains beyond, over the great north plain, over the Rhine valley, to settle and teach. However far they went, they held fast, as it were, to a cord that bound them closely to Rome.

THE LITTLE MAN WITH THE GREAT WILL, AND HIS FAMOUS SON CHARLEMAGNE

Now, when Pepin, the Frank, the little man with the great will, went to keep the Lombards in order out of gratitude to the pope, who had helped him to become king, he took from them the land they owned about Rome, and presented it to the Head of the Church. This was the beginning of the pope's claim to rule over an earthly kingdom.

Pepin's great son, the hero Charlemagne, also helped on the influence of the Church in his enormous dominions. We have already seen in the story of France how these included, besides what is now France, Holland and Belgium, Switzerland, North Italy, and part of Spain, as well as nearly all that part of Central Europe we now call Germany. Charlemagne gave many estates in all these countries to the bishops and to monasteries, where the clergy lived together, writing books and teaching in schools. More than that, Charlemagne went in person to the rescue of the pope when he was set upon by enemies; so it happened that the great ruler of countries kept Christmas in Rome in the year 800 A.D., and was present at the festival service in St. Peter's.

HOW THE POPE CROWNED THE GREAT EMPEROR IN ST. PETER'S

The pope himself chanted the Mass, and the hearts of the congregation were stirred within them with the grand music and the solemn ceremonial. At the close a great surprise was in store, it is said, even for Charlemagne himself. The pope rose, and taking a splendid crown in his hands, placed it on the king's head, saying: "God grant life and victory to the great Emperor Cæsar Augustus." The soldiers, people, clergy, all burst into loud shouts of delight. Charlemagne was the strong man of the times, and well fitted to defend a new world-wide Roman Empire of all Christendom—later they called it the Holy Roman Empire—in which the pope's power was ever to become greater over the faith of the nations that composed it.

We shall see what a dark shadow was cast over both Germany and Italy by that union, so loudly applauded in St. Peter's that Christmas Day—a shadow not lifted for a thousand years.

We have seen how soon the great empire of Charlemagne fell to pieces, and how France began to take shape under its own line of kings. In Germany it was very different. For centuries the tribes were gradually settling down into practically independent states, loosely held together under the tie of the empire. The rulers of the states had different titles and powers, and the chief ones elected the emperor, with the help of three powerful archbishops.

Looking at the history of these centuries in Germany is like looking into a kaleidoscope, every turn of which, as the years pass, brings fresh combinations and passing changes, as now one state takes the lead, absorbing others or driving them to another part of the country, now another rises into being as others move about or disappear.

THE GHOST OF AN EMPIRE THAT DISTURBED A THOUSAND YEARS

Within 200 years of the death of Charlemagne there were great changes, too, along the eastern borders. The wild Hungarians, of a quite different race from the German families, spread terror over the land. Later they settled down and became part of the empire, though as independent as the rest.

The French writer Voltaire has said that the Holy Roman Empire was neither holy, nor Roman, nor an empire. It has been called a mere spectre or ghost of an empire. But it proved strong enough for a thousand years to hinder German kings giving their best efforts to looking well after their own country, being distracted by the ever-enticing vision of power on the other side of the Alps. Their Italian subjects hated them, and the quarrels that arose between the emperors and the popes were so constant and so fierce and so intricate that a just settlement became more and more impossible as the years dragged on.

TWO FOUNDERS OF GERMAN GREATNESS

The hero-emperor of Germany in the Middle Ages was Frederick Barbarossa, whose name means red beard. He was elected king at a time of unrest, because he was a strong, brave man; and later the pope crowned him Holy Roman Emperor. The above picture shows Barbarossa being proclaimed king of the Germans.

During the Middle Ages, the knights who lived in the strong castles of Germany became very powerful, and did just as they liked. When Rudolph of Hapsburg, the ancestor of the present Austrian Emperor, was elected Emperor of Germany in 1273, he determined to stop the robberies of these knights and to break their power, and here we see him condemning some robber-knights who have been captured.

Let us see how one of the strongest popes treated one of the weakest emperors. It was about the time when the Conqueror was "settling" England.

The priest Hildebrand had been so popular, toiling with all his might to set right the wrong things in the Church, and to make it strong and pure, that the people of Rome rushed into the church at the funeral of the pope who had just died, shouting: "St. Peter wills Hildebrand to be pope!"

THE COMING OF HILDEBRAND AS POPE GREGORY, AND AN EMPEROR'S QUARREL

The unwise ruler of Germany, Henry IV., defied this new pope, called Gregory VII., and his reforms, appointed bad men to high posts, and finally sent out a message to the world declaring Gregory to be pope no longer. Gregory answered with the terrible punishment of excommunication, which meant that the emperor was put out of the Church, and no priest might minister to him.

After a time Henry gave in and crossed the Alps, and then on to the Apennine Hills, at Canossa, where Gregory was staying, to beg for pardon. It was the depth of winter, and Henry had to wait about for three days in deep snow, barefoot, and in a miserable thin shirt, shivering till the pope chose to see him and forgive him.

Of a very different type was the hero-emperor Barbarossa, Frederick of the Red Beard. His strong, pleasant, smiling face seems to stand out across the centuries, and many are the stories of his bravery and endurance, and how he tried to make the empire complete and independent.

HOW THE QUARREL BETWEEN THE KINGS AND THE POPES ENDED IN VENICE

Five times he crossed the Alps, and had many struggles with the popes. But, strong as he was, he, too, had in the end to give way. In that twelfth century there were violent disputes for ever going on between the Church and the Christian rulers of Europe. In the history of England, we have read, elsewhere, of the tragic death of Thomas à Becket at Canterbury, and the penance of the king. Seven years later the long contest between the Bishop of Rome and the Emperor of Rome also ended in victory for the Church. The opponents were persuaded to meet together in Venice, the beautiful and independent city at the head of the Adriatic Sea. Three slabs of marble are shown to this day in the porch of St. Mark's—the lovely cathedral shown on page 609—as the spot where the greatest prince of the age, Barbarossa, knelt to kiss the pope's foot, and receive in return the old man's kiss of peace. It must have been a bitter moment for the emperor—Emperor of Rome merely in name, as he said—for the act of submission meant giving up the desire of his life. Later stories, not founded on fact, but due to the imagination of poets and painters, say that the pope set his foot on the neck of the kneeling emperor, saying: "The young lion and the dragon shalt thou trample under foot." In answer, the imperial "footstool" muttered under his red beard: "Not unto thee, but unto St. Peter be this honor." Any way, the tellers of the story understood the strife of the times and the character of Barbarossa.

THE OLD TIMES IN THE OLD TOWNS OF GERMANY

His last effort was to join Richard of the Lion Heart in the Third Crusade to recover Jerusalem from the Moslems. The great emperor was drowned while crossing a river in Asia, and he was buried in the sandy desert. But the old German poets have kept his memory green in song and legend, and the hope lived on that he would come again to help his people in time of need.

In the time of the Crusades the power of the nobles in Germany was very great. They held their lands on the same feudal plan as in France and England, and the peasants were very poor and wretched. Fine towns with strong walls began to rise over the country in order to resist the foes from without, and by degrees churches and universities, good houses and halls, were built, many of which have survived.

Germany to-day is famed for her splendid old towns. Many of the towns bought special privileges and freedom, and some of them became rich and powerful. A large number of these cities, of which the chief were Lübeck, Hamburg, and Bremen, banded together to form the Hanseatic League. They had important settlements in the other countries of North Europe, especially England, Norway, and Russia, and had many special rights which increased their trade and

wealth. The trade of the Baltic was in their hands, and they even made war on their own account, being strong enough to withstand not only the nobles, but pirates at sea and robbers on land.

The robber knights who lived in the castles still crowning many rocky hills were a terrible hindrance to trade and farming in lawless times. The stories of how they sallied forth, attacking merchants at the fords or bridges, and seizing the newly-gathered crops, are most exciting. The knights of the castles were not all robbers, for on them depended the keeping of the roads and the tow-paths, and the entertaining of travelers before there were any inns.

RUDOLPH OF HAPSBURG, WHOSE FAMILY RULED THE EMPIRE 600 YEARS

An emperor who stands out from a time of universal confusion is Rudolph of Hapsburg, who became the founder of the Austrian House of Hapsburgs, in whose family, with some exceptions, the imperial crown remained until 1806.

Austria means the East Land, and the duchy gradually grew and spread, with many a change as the kaleidoscope turned, chiefly along the splendid Danube river, which rises near the Rhine in the Black Forest and flows across Bavaria, Austria, and Hungary on its way to the Black Sea. The brave mountaineers of the Alps had to league together against the Hapsburgs, as we learn from the story of Switzerland.

The energetic, intelligent, noble-hearted Maximilian I. was a Hapsburg, and he married the heiress of Burgundy and the Netherlands. Their son became Philip I., King of Spain, as he married the daughter of Ferdinand and Isabella, of whom we read on page 3340.

It has been said that Maximilian stands as a boundary stone between the old times and the modern. We have already seen in the story of England and France how everything began to expand and change during this age of Columbus.

THE GREAT PART THAT GERMANY PLAYED IN GREAT WORLD-CHANGES

While the discovery of the compass put into men's hands a guide by which to sail in unknown seas, the invention of printing and the spread of learning made men think and study. Germany had some share in this advancement. Many people believe, though it is not quite certain, that it was a German who first thought of printing with movable letters; it was a German monk who set all Europe in a blaze by preaching against wrong-doing.

The emperor at the time was Charles V., the grandson of Maximilian, often called a second Charlemagne, from the greatness of his dominions; for by inheritance he added to the German states, Spain, the south of Italy and Sicily, and the Netherlands, as well as colonies in the New World. It was an empire on which the sun never set. Early in his reign there was a terrible insurrection of the people, called the Peasants' War. They burned castles and monasteries, as did the peasants of France about 300 years later, and for much the same reasons—the grievous and unfair taxes, and the bitter oppression under which they suffered. This war was scarcely over when all Germany was roused by Martin Luther burning publicly the deed of the pope that excommunicated him for his teaching.

Charles V. was against Luther, but many of the princes supported him; and the protest they drew up, saying they could not tolerate in their lands the following of a religion which they held to be against God's Word, gained them the title of Protestants, the name since given to all those who will not accept the authority of the Church of Rome.

THE TERRIBLE STORY OF THE STRUGGLE FOR FREEDOM IN RELIGION

The Germans owe their first popular translation of the Bible in their native tongue to Luther, as we owe ours to Tyndale; and the invention of printing, slowly working from improvement to improvement, made it possible to send it broadcast among the German homes all over the land, in the fine cities, in the beautiful valleys of the hill countries, in the broad north plain.

The story of how religious liberty was gained in France and in Great Britain is sad enough. In Germany thirty years of war caused unspeakable ruin and misery to the country before people gained to some extent, the right of following the religion they believed to be the true one. There were many bitter quarrels between Catholics and Protestants, and the quarrels between different kinds of Protestants. The confusion was terrible, because the princes of the various states did their best to insist on their

right to force the people who were subject to them to hold the same religious beliefs that they did themselves. They believed also that the territory over which they ruled was theirs to do with as they pleased—to sell, or leave to their children, or give away. This added to the confusion, for many of the princes divided their territories between their sons, and each division gave a new prince to the empire.

Suppose for a moment that the governor of the State of Texas, or the Province of Manitoba, gained the power to call himself a duke, and that he had the right to divide it among his sons, each of whom would have the right to call himself duke of his own little section, and had power to make what laws he thought best and to make war on his neighbors as he pleased. Then suppose that the same thing had been going on all over the country for a long time, and you can gain some idea of the state of Germany at this time.

In the days of the first emperors, Germany was composed of a small number of large duchies, which practically corresponded to the old tribal lands. By the time of the Reformation, however, the empire had been divided into over three hundred separate states. A few of them were large duchies, but some were no larger than a good sized western ranch. Some of them were towns to which the emperors had given rights of self-government, and some of them were church states, and were governed by bishops, who thought that they owed more allegiance to the Pope than they did to the emperor. Among all these divisions, and warring interests, the emperor, whose power had never been great, could not hold the balance and enforce peace. The early emperors were strong men, who were able in a measure to hold their own, and as there were large royal domains or state lands which could be made to bring in an income, they could obtain money for their needs.

WHY IT WAS THE EMPEROR COULD NOT IMPOSE HIS WILL

But as time went on, not only the domains, but most of the imperial privileges were given away; sometimes in return for aid in time of war, but sometimes as rewards to favorites, or even to pay for support in the election of the emperor's son as King of the Romans, the title which was given to the future emperor. Some of the emperors, too, spent long periods of time in Italy, and then the princes in Germany were able to seize powers, which the emperors could not always get back. Gradually, therefore, it came to pass that the emperor's power became so small that he had little real influence unless he had great dominions of his own. Charles V was powerful, not because he was emperor, but because he ruled Spain and the Netherlands, then the richest and most powerful countries in Europe. But even Charles V was not able to prevent the spread of the Reformation in Germany.

When Luther first preached his doctrines, Charles was engaged in war with the Turks, and with Francis I of France. As soon as he was sufficiently freed from these, however, he attacked the Protestant princes, defeated them in battle, and treated the defeated princes with great severity. Nevertheless, though he had more power than any of the emperors who came after him, Charles had to make concessions, and after much fighting and discussion it was agreed that tolerance should be shown to the Lutheran form of worship. No Lutheran prince was to be interfered with, but it was agreed that the people of each state should profess the same faith as their prince and no promise of toleration was given to the followers of John Calvin, the French reformer, who preached in Switzerland, and gained many disciples in Germany. These Calvinists were called Presbyterians in Scotland.

Shortly after peace was made, Charles V abdicated the throne and went to live in a Spanish monastery. He had already given his Austrian duchies to his brother Ferdinand, king of Hungary and Bohemia, and he now gave Spain, the Netherlands, his great American possessions, and his duchy of Milan in Italy to his only son Philip, who had married Queen Mary of England. Charles had hoped that his son would succeed him as emperor, but the electors refused to accept Philip, and chose Ferdinand instead.

Ferdinand was much more tolerant than his brother Charles, and in his reign and the reign of his son, the Protestants in the empire increased greatly in numbers. Many Protestant churches were built in the Roman Catholic states, and even in the family dominions of the em-

The first king of Prussia, Frederick I., was a good ruler, and so that his subjects should be able to read the Bible, he started thousands of schools in the villages and compelled the children to attend. Here he is visiting a school and examining the children. Frederick I. crowned himself king, and Frederick the Great said of this: "It was as though he told his successors, 'I have won for you a title; make yourselves worthy of it.'"

During most of his life Frederick the Great was engaged in wars which threatened to destroy his kingdom, but by brilliant generalship he defeated his enemies and made Prussia great. When not fighting, the king used to travel about his kingdom and talk with the people, encouraging them to make roads and canals and otherwise improve their country. This picture shows him on his travels, his subjects giving him a welcome.

peror, and some of the church states followed their bishops in adopting the Protestant faith.

But by the time that Ferdinand's grandson began to reign, a change had come. As they increased in number, the Protestants quarreled among themselves, Lutherans and Calvinists hurling the name of heretic at one another. As the Protestants became weakened by division, the Roman Catholic princes, who stood together, and looked upon their Protestant subjects as traitors as well as heretics, determined to stop any form of Protestant worship, and began to encroach on the rights given to the Protestants. This state of affairs could not last, and trouble broke out in Bohemia.

THE BEGINNING OF THE THIRTY YEARS WAR

The Bohemians, most of whom were Protestants, feared that Ferdinand II would oppose them, as he had already oppressed the Protestants in part of the Austrian territories. They rebelled against his authority, asserted that he had been unlawfully declared king, and invited Frederick, the young elector of the Palatinate, to come and reign over them. Frederick's wife was the Princess Elizabeth of England, daughter of James I, whom the Bohemians expected to send help to the prince, and they also hoped that the other Protestant princes would go to their assistance. They were disappointed, and with the help of Maximilian, the duke of Bavaria, the poor "Winter King," as Frederick was called, was defeated, and fled from Bohemia, and the emperor was able to treat the country as a conquered land.

The war might have ended there, but the emperor drove Frederick out of the Palatinate so that he might give it to Maximilian of Bavaria, who coveted it. Other princes, under the leadership of Christian IV of Denmark, then went to Frederick's assistance, and the war became a struggle between the Roman Catholics and Protestants in the empire. It lasted for thirty years, and during this time, every part of northern Germany was ravaged again and again with savage ferocity.

The greatest generals on the emperor's side were Tilly and Wallenstein, and Wallenstein's name became another word for cruelty. By an agreement with the emperor, he gave his soldiers no pay, and they lived by pillaging the people of the districts through which they passed.

THE COMING OF THE GREAT GUSTAVUS ADOLPHUS

In the early years of the war, the emperor's troops were victorious and it seemed as though the Protestant faith would be swept out of Germany. But a champion appeared in 1630, in the great king of Sweden, Gustavus Adolphus, who left his kingdom, and his baby daughter Christina, to the care of his counselors and went to the rescue of the distressed Protestants in Germany.

His army was not large, but it was well trained, and he held it in iron discipline, and when the North Germans found he could lead them, they gathered under his banner. He induced the elector of Brandenburg, who had been making no attempt to stem the tide, to join him, won over the king of Saxony from the emperor's side, and got help from the king of France, with whom he was allied. At first the emperor's courtiers sneered at the "Snow King" as they called Gustavus, but the emperor's soldiers soon found that they had met one of the greatest soldiers of the age. Tilly, whom he defeated in two battles, died of his wounds, and then Wallenstein, who had been dismissed by the emperor, was recalled. Gustavus met him at the battle of Lutzen, near Leipzig, in November, 1632. The Swedish army won the day, but they mourned as if they had been defeated, for the king was slain, and historians say that his death was a greater hurt to his cause than the loss of ten battles.

There was now no one who could oppose Wallenstein, and it appeared as if the emperor would be victorious. But Wallenstein, who was as ambitious as he was cruel, was accused of plotting to put himself in the emperor's place, and he was assassinated by some soldiers in his own army.

THE BITTERNESS OF A WAR THAT NEVER SEEMED TO END

After his death the war went on and on, until the whole country was completely exhausted. From the commencement of the fighting Spanish soldiers had been helping the emperor, and French and Swedish, German and Spanish armies swept back and forth over the famished land. Now one side, now another was victorious, but the unfortunate

people saw little difference between the cruelties and oppressions of one army and those of another. At last, when thirty years had passed, and men had almost forgotten why the war began, peace was made. A conference met in Westphalia to which delegates were sent by all the princes who were at war, and after four years of negotiation a treaty, called the Peace of Westphalia, was signed in 1648. By this peace it was agreed that the Roman, Lutheran, and Calvinist faiths were to be equally tolerated throughout the empire, except in the Austrian dominions, which were to remain purely Roman Catholic. The princes of the empire were given the right to make treaties or wage war, not only among themselves but with foreign nations, and the shadowy power of the emperor almost vanished.

The Protestant princes were permitted to keep the church lands they had taken before the year 1624. Holland and Switzerland were given independence; part of Pomerania was given to Sweden, and Alsace and the bishoprics of Metz, Verdun and Toul were made part of France. Long before this the war had become wholly political, and every one tried to get something out of the wreck. The princes of the empire were each greedy of making gains, Louis XIV wanted to make the Rhine the boundary of France and from the beginning the Swedes had been ambitious of making the Baltic a Swedish lake.

THE SADNESS OF THE DESOLATE LAND WHEN THE WAR WAS ENDED

The whole country lay in ruin. Towns had been destroyed, woods flourished where once villages and cultivated land had been. Commerce had disappeared. The population had been reduced from twenty millions to six, and the spirit of the people that remained was crushed and broken. It was a hundred and fifty years before Germany began to show signs of prosperity again. So weak and disheartened were the people that they had no spirit left to oppose the princes, who began at this time to make themselves more absolute than ever they had been before. Instead of helping the people to recover from their misery, they tried to copy the magnificence of the court of Louis XIV of France. Many of the princes built great palaces and fortresses, and the unfortunate peasants were taxed to pay for these costly and useless luxuries. Louis, who desired to weaken the empire still more, so that he might be able to win more territory, encouraged them in their extravagance, and some of them were not above being in his pay.

THE AMBITIONS OF LOUIS XIV AND THE WARS WHICH THEY CAUSED

The ambition of Louis XIV soon brought war again within the borders of the worn-out country. At that time the country which we now know as Belgium was part of the dominions of the Spanish king. Louis tried to take it, saying that it really belonged to his wife, who was a Spanish princess, but was prevented by William of Orange, the stadtholder or chief magistrate of Holland. Some of the German princes became the allies of Louis; the war was carried into Germany and the Palatinate was again devastated. Louis did not succeed in gaining the Netherlands, but by the treaty that ended the war, Franche Comté was added to France, and a few years later he took possession of the city of Strassburg.

HOW THE TURKS WERE BEATEN BACK FROM THE GATES OF VIENNA

Scarcely had peace been signed before Louis again invaded the Palatinate on the pretence that part of it belonged to his brother's wife. To help him in his plans, he encouraged the Turks, who had again begun to advance in Hungary, to invade Austria, and with 200,000 men, the Turkish general, Kara Mustapha, swept through that country and laid siege to Vienna. The siege lasted two months, and though the city made a brave resistance, it was on the verge of being captured when John Sobieski, the last great king of Poland, came to the rescue. With an army of Poles and Germans, he drove the Turks from the walls of Vienna, and their power has ever since been on the wane.

Soon after this, since King William of England and Holland had entered the war against him, Louis was compelled to make peace, and give back all the cities he had taken except Strassburg. His ambition, however, was not curbed, and when, a few years afterward, the king of Spain died without heirs, Louis commenced another war to make his grandson, Philip, king of Spain, a title which was also claimed by the emperor. In this war, which was also fought out in

Germany and the Netherlands, England and Holland were the emperor's allies, and the famous battles of Blenheim, Ramillies, Oudenarde and Malplaquet were won by the English duke of Marlborough, and Prince Eugene of Savoy. This war, which was also carried on in America between the French and English, is known in European history as the War of the Spanish Succession, and in the history of the United States as Queen Anne's War. It did not end until 1713, when it was closed by the Peace of Utrecht. Some of the princes of the empire fought against the emperor, but some of them were on his side, and among these were the elector of Hanover, who was afterward George I of England, and the elector of Brandenburg, who had at this time the finest army in the empire.

How Prussia Rose to be a Great Power in Germany

At the close of the Thirty Years War, Brandenburg was a wreck, but the young elector, Frederick William, was one of the few princes who, instead of wasting what was left in luxury, used all his strength in building up the prosperity of the country. Since his time his descendants have played a most important part in the history of Germany, and have made Prussia so important that when we speak of Germany we think of Prussia. The rise of the house of Hohenzollern, to which they belong, is one of the romances in history, and we must go back and learn something of their story.

In the twelfth century, Frederick, count of Hohenzollern, married the daughter of the burgrave or chief magistrate of the important Imperial City of Nuremberg, and when his father-in-law died became burgrave in his place. His descendants continued to hold this rich office, and even became princes of the empire. They prospered exceedingly, and, in the thirteenth century, Frederick of Nuremberg had sufficient influence to have his uncle, Rudolph of Hapsburg, elected emperor.

The Rule of the Great Elector in Brandenburg

All the Hohenzollerns were shrewd, thrifty men. They amassed great riches in the family and when the Emperor Sigismund needed a large sum of money Frederick IV, burgrave of Nuremberg, was able to lend it to him. As security for repayment he took a mortgage on the mark of Brandenburg, a state in North Germany, and within a year or two, was invested with the titles of margrave and elector of Brandenburg. The electors of Brandenburg were wiser than their neighbors and did not adopt the practice of dividing their territories among their sons. On the contrary a family agreement was made to keep the family possessions undivided and as time went on their dominions were increased, by purchase or inheritance, or by conquest. For instance, when the duke of Prussia died in 1618, he was succeeded as duke by his cousin, the elector of Brandenburg, who had married his daughter. At the close of the Thirty Years War, the ruling margrave, or elector, was a young man, Frederick William I, who is known as the Great Elector. When peace was made, Frederick William was able to gain some of the church lands and part of Pomerania, and thus enlarged the territory that his father had left him.

The Great Elector is justly held in honor by the Prussian nation. He built a canal to join the Elbe to the Oder, made roads, drained swamps, improved agriculture and encouraged education, and before he died he succeeded in making Brandenburg the most important state in North Germany. Frederick saw that he could not have good government while the nobles were strong enough to defy him. He succeeded in curbing their power, but by so doing made himself almost an absolute ruler. He never even thought, however, of giving any share in the government to the rest of the people, and when the nobles lost power, there was nothing to check the power of the elector. The peasants were not freed from serfdom until the beginning of the nineteenth century.

Up to the Great Elector's time, Prussia had been a fief of Poland, but by taking first one side, and then another in a war between the kings of Poland and Sweden, he was able to gain complete independence of the duchy. He created a powerful army, and took part in all the wars of his time. Sometimes he was on the side of France, sometimes on the side of Holland or the emperor against Louis.

His son Frederick was not content with the title of elector; he wanted to be king. So he bought the title from the emperor by sending an army of 10,000 men to help in the Spanish Succession War. As

king, however, he wished to be quite independent, and so he took his title from Prussia, which was outside the empire, and crowned himself king of Prussia.

How Frederick the Great Built Up the Prussian Power

Of Frederick's successors, Frederick William, and Frederick the Great, you may read in another place in this book. We need only say here that Frederick the Great welded his scattered dominions into the kingdom of Prussia. When he became king, Brandenburg was stronger than any other state in the empire except Austria, and before he died he made Prussia the rival of Austria, and began a struggle to see which should be supreme in the empire. During his reign the whole empire was again convulsed by the War of the Austrian Succession, in which the king of France helped the king of Bavaria to try to get the Austrian dominions away from Queen Maria Theresa. This war was partly caused by Frederick's ambition to gain territory, and the Seven Years War, of which we read in the story of Frederick, was a direct result of his conquest of Silesia from Austria.

The Seven Years War was fought out in several parts of the world, and is known in the history of the United States as the French and Indian War.

Frederick helped to make the elector of Bavaria emperor as Charles VII, but after the death of Charles, Maria Theresa's husband, Duke Francis of Tuscany, was chosen to succeed him. When the Emperor Francis died, he was succeeded by his son and Maria Theresa's, and so the title of Holy Roman Emperor went back to the Hapsburgs, who held it until Napoleon's time.

The French Revolution and the Wars That Followed It

When Frederick the Great died in 1786, Louis XVI was king of France, and with his wife Marie Antoinette, the beautiful daughter of Maria Theresa, he held court at Versailles with great magnificence. But a few years afterward the French Revolution broke out. As we have read in the story of France the king and queen were deposed, France was declared a republic, and Louis and Marie Antoinette were put to death.

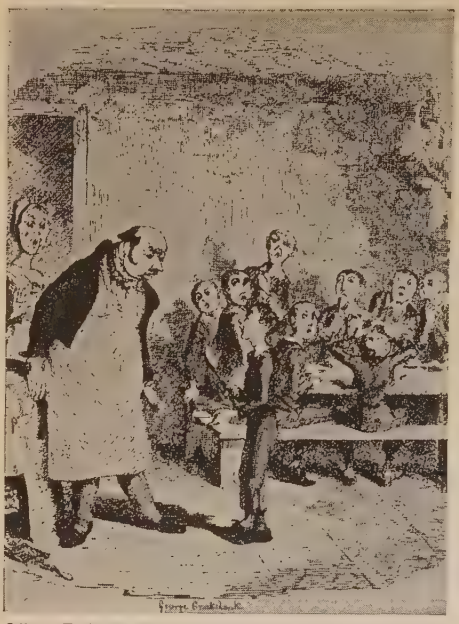
It took time for all these things to happen. Before the execution of Marie Antoinette, her brother Joseph II, and her brother Leopold II who succeeded him, had both died, and Francis II, who was not so wise as either of the two, was emperor. But Frederick William II, who followed Frederick the Great as king of Prussia, had made an alliance with Leopold to oppose France, restore the kingdom, and keep the doctrines of the Revolution out of their dominions.

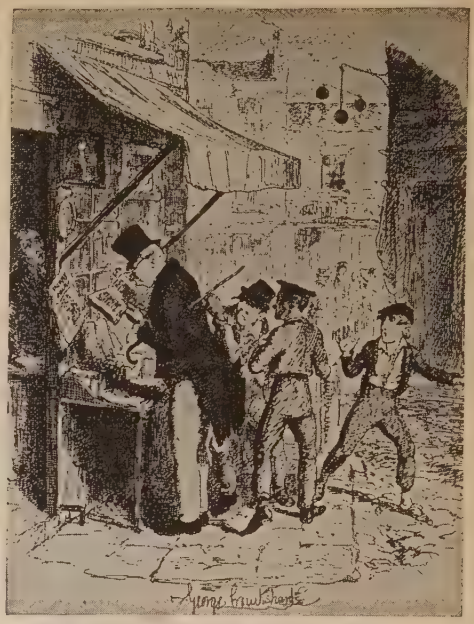
This alliance brought on a war with France, for the French Assembly, fearing that Austria and Prussia would invade their country, declared war against Austria, and this war was continued by Francis II. The war gave Napoleon an opportunity to realize his desire for conquest, and his dreams of empire. After he rose to power, Austria and Prussia were in turn defeated and humiliated. War followed war, and victory by the French was piled on victory. During these wars, and by reason of these victories, the Rhine was made the frontier from Switzerland to Holland. All the free towns, except Bremen, Lübeck and Hamburg, lost their independence, and the little states which were ruled by knights and bishops were made part of the larger states by which they were surrounded. At the close of 1805, Napoleon forced Francis II, Emperor of Austria, to sign a treaty which declared that all the states of Germany then in existence were sovereign states. This ended forever the Holy Roman Empire. Francis formally renounced the title of Holy Roman Emperor, and was known from thenceforth as Emperor of Austria, a title that he had taken to himself two years before.

During the Napoleonic Wars serfdom disappeared from all the German countries which had composed the Holy Roman Empire, except Austria. In most of the states the last traces of bondage simply slipped out of sight, but in Prussia the serfs were freed by a royal decree made in 1807. Up to this time the Prussian peasants had been compelled to live on the land on which they had been born. Henceforth every man was free to go where he would, without the consent of his lord, and even to buy land if he wished. Thus the people gained much, in spite of defeat and humiliations, and they have never since that time been placed in such subjection as they had been in before. No political rights were granted them, however, until forty years later.

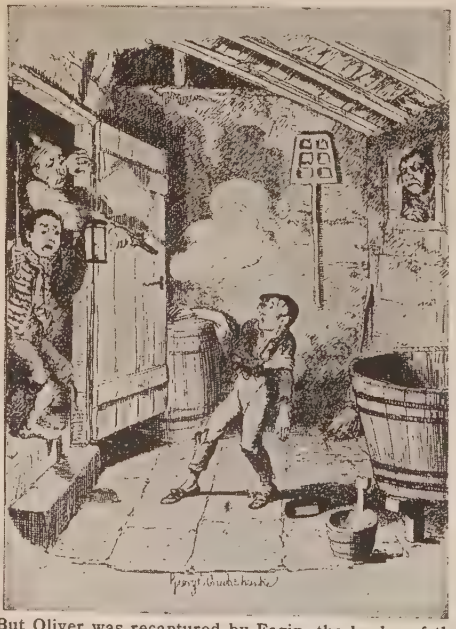
THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 2593.

SCENES FROM THE STORY OF OLIVER TWIST





Oliver Twist was an orphan, who was brought up by the parish until he was ten. They were so badly fed in the workhouse, getting little more than a small basin of thin gruel for each meal, that the boys drew lots for one of them to ask for more. It fell to Oliver to make this request. His boldness resulted in his being sent out of the workhouse as an apprentice to a coffin-maker, from whom he ran away, and fell in with a gang of young thieves in London. One of them, the "Artful Dodger," robbed a gentleman at a bookstall, but Oliver was captured. The bookseller proved Oliver was not the thief, and the gentleman took him to live with him.



But Oliver was recaptured by Fagin, the leader of the thieves, and was handed over to Bill Sikes, to assist that villain in the burglary of Mrs. Maylie's house. Oliver made up his mind that when he was put through the window he would alarm the household, but before he could do so he was shot in the arm by the butler. Here again he fell in with friends, as Mrs. Maylie adopted him, and educated him like a young gentleman. In the last picture we see Fagin and a man named Monks, who have an evil plot against Oliver, watching him as he was asleep at his books on a summer day. But, happily for all, these scoundrels are punished at last.

These pictures are from the famous original engravings by George Cruikshank in the first edition of "Oliver Twist."

THE STORIES OF CHARLES DICKENS

MOST of the great novels of Charles Dickens were written "with a purpose." While they were first of all intended to amuse the reader, they were also meant to draw attention to some unhappy state of things which the author, out of his warm love of humanity, sought to have abolished. Thus in "Oliver Twist" he exposes the shameful state of the public workhouses at the time of which he wrote, the early years of last century, and the result of the book was so to awaken interest in the life of the pauper poor that before long there were no Mr. Bumbles to tyrannize over the workhouse children. In the story called "Dombey and Son," whose full title is "Dealings with the Firm of Dombey and Son, Wholesale, Retail and for Exportation," we see how love of money-making and mere pride in business success are poor substitutes for the happiness that comes from love and affection for our own relatives and others.

THE BOY WHO ASKED FOR MORE

BEING THE STORY OF OLIVER TWIST

CONTINUED FROM 2462

IN the workhouse of a certain English town a baby boy was born. He was christened Oliver Twist, because the beadle, or workhouse officer, whose name was Bumble, gave names to the children born in the workhouse by going through the alphabet from A to Z in the order of their births. He had got to T when Oliver was born. As the mother of the new parish baby died soon after his birth, Oliver was in every sense a poor foundling without friends or relations, so far as anyone knew. This was truly a very unpromising beginning for the boy, but we shall see how fortune favored him after many extraordinary adventures.

In those days the workhouses of England were shamefully conducted. The one thought of all who were responsible for their management was how to run them cheaply, and as a consequence many of the poor young inmates were done to death by slow starvation and brutal treatment. When Oliver had grown into boyhood, he was sent to live with a Mrs. Mann, who kept a branch workhouse, where a number of other parish children were under her care, all being treated worse than dogs. After a time, however, he was taken back to the chief workhouse to undergo his "education" along with other boys of his age. But though he had been starved to a skeleton at Mrs. Mann's, matters were, if anything, worse at the workhouse now, for the board had decided to carry out further economies in the feeding of the inmates, and the result of this was to be of the greatest importance to poor little Oliver.

"The room in which the boys were fed was a large stone hall, with a copper at one end, out of which the master, dressed in an apron for the purpose, and assisted by one or two women, ladled the gruel at meal-times. Of this festive composition each boy had one porringer, and no more—except on occasions of great public rejoicing, when he had two ounces and a quarter of bread besides. The bowls never needed washing. The boys polished them with their spoons till they shone again; and when they had performed this operation (which never took very long, the spoons being nearly as large as the bowls), they would sit staring at the copper, with eager eyes, as if they could have devoured the very bricks of which it was composed, employing themselves, meanwhile, in sucking their fingers most assiduously, with a view of catching up any stray splashes of gruel that might have been cast thereon. Boys have generally excellent appetites. Oliver Twist and his companions suffered the tortures of slow starvation for three months; at last they got so voracious and wild with hunger that one boy, who was tall

for his age, and hadn't been used to that sort of thing (for his father had kept a small cook-shop), hinted darkly to his companions, that unless he had another basin of gruel each day, he was afraid he might some night happen to eat the boy who slept next him, who happened to be a weakly youth of tender age. He had a wild, hungry eye; and they implicitly believed him. A council was held; lots were cast who should walk up to the master after supper that evening, and ask for more; and it fell to Oliver."

OLIVER ASTONISHES THE WORKHOUSE MASTER BY ASKING FOR "MORE!"

"The evening arrived; the boys took their places. The master, in his cook's uniform, stationed himself at the copper; his pauper assistants ranged themselves behind him; the gruel was served out; and a long grace was said over the short commons. The gruel disappeared; the boys whispered to each other, and winked at Oliver; while his next neighbors nudged him. Child as he was, he was desperate with hunger, and reckless with misery. He rose from the table; and advancing to the master, basin and spoon in hand, said, somewhat alarmed at his own temerity:

" 'Please sir, I want some more.'

"The master was a fat, healthy man; but he turned very pale. He gazed in stupefied astonishment on the small rebel for some seconds, and then clung for support to the copper. The assistants were paralysed with wonder; the boys with fear.

" ' What!' said the master at length, in a faint voice.

" 'Please, sir,' replied Oliver, 'I want some more.'

"The master aimed a blow at Oliver's head with the ladle; pinioned him in his arms; and shrieked for the beadle."

OLIVER IS APPRENTICED TO A COFFIN-MAKER AND RUNS AWAY

The end of the matter, so far as the workhouse authorities were concerned, was to offer five pounds to anybody who would take this bold boy off their hands and make him an apprentice. So, as speedily as possible, he was put out to an undertaker named Sowerberry, where he was fed on the scraps left over from the family table, and had to sleep under the counter. An older boy, named Noah Claypole who was employed there, bullied the pale-faced little fellow so much that Oliver turned upon him one day in the kitchen, and thrashed him, despite the efforts of Charlotte, the servant, to keep him away from Noah, who was her favorite. Of course Mrs. Sowerberry took the word of Charlotte and Noah that Oliver was a little wretch who required punishment, and Noah ran away to bring the fat and lazy Mr. Bumble, who was not at all surprized, he assured them, to hear of any outrage by that terrible boy, Oliver. Rather against the will of the undertaker, who had found the boy useful, on account of his pale, sad face, at funerals, Oliver was shut up in the dark cellar for the night. Early next morning he escaped from the undertaker's and set out to walk to London.

It was a long and toilsome journey which the unhappy boy had undertaken, and after six days' tramping and begging food, almost dead with fatigue and hunger, he reached Barnet. Here he fell in with a young rascal who had much to do with his later fortunes.

OLIVER FALLS IN WITH THE ARTFUL DODGER ON HIS WAY TO LONDON

He was a jolly, free-and-easy vagabond, this new acquaintance, who promised to put Oliver in the way of a living when they got to London. John Dawkins by name, he was more famous as the "Artful Dodger," and when he got to the outskirts of the town, in company with the country boy, Master Dawkins lingered about till dark, as he thought he was too well known in London to be seen entering it in full daylight. Through the lowest streets of the town the Dodger piloted innocent and weary Oliver, and landed him at last in an evil-looking street, where he gained admission to a still more evil-looking house. This was none other than the notorious den of Fagin, the Jew.

Here the astonished boy discovered the master of the house cooking sausages at the kitchen fire, while a number of other youths, resembling the Dodger, were smoking and drinking at the table. Fagin, with his long, rough beard and tousled hair, of reddish colour, his great hook nose and dirty, swarthy face, his bent shoulders and thin, bony figure, clad in threadbare clothes, was the very picture of evil. Oliver could not at first realize that he was in a den of thieves, and that he was supposed to be a new pupil for Fagin. But

so it was, and he soon discovered that the Jew spent much of his time in teaching his young rascals how to pick pockets.

One day Oliver was out with the Dodger and Charley Bates, another of the young thieves. Oliver had no idea of what they were bent on, and he didn't understand half of the slang words they used. But they tried to rob an old gentleman who was examining books at a bookshop window; and, amazed at this, Oliver ran away from them, only to be caught and accused of the theft. Fortunately, the bookseller saw the whole thing; and the old gentleman, whose name was Mr. Brownlow, was so convinced that Oliver was an honest, truthful boy that he took him to his own home and decided to keep him as his adopted son. His housekeeper, Mrs. Bedwin, soon grew to love the lonely little boy, and he was treated so kindly that it seemed as if his troubles were over; but, alas! that was not so. One day, when he was sent out with some books and a five-pound note to take to the bookseller, poor Oliver was captured by Nancy, a pupil of Fagin, and Bill Sikes, a great brutal burglar, whom Fagin employed.

How Oliver was kidnapped from his kind friend Mr. Brownlow

They carried him off a prisoner to the Jew's den once more. He was in despair at what his kind friends, Mr. Brownlow and Mrs. Bedwin, would think of him; but Fagin would not let him go. The Jew had some plan for him, and a prisoner he remained, until one night he was taken away by Bill Sikes, and next morning set out with that scoundrel on a long journey into the country.

At Chertsey, on the Thames, there was a house which Sikes and Toby Crackit, another burglar, were to rob; and Oliver was to be used, because he was little, for putting through a small kitchen window, so that he might go through to the hall and let the burglars in. When he understood what they meant him to do, he determined to alarm the people in the house and tell them all; but he did not get the chance to do this, as Giles, the butler, and Brittles, a serving lad, had heard the noise of the window being forced, and, coming downstairs in time, fired at Oliver, wounding him severely in the arm. Bill Sikes had just time to pull the lad back through the window and make off with him. Eluding pursuit, the burglars left Oliver for dead in a field and made off. Next day, when he recovered, poor Oliver dragged himself to the house Sikes had meant to rob, and was recognized as the boy who had been shot by the butler.

Another terrible adventure that had a happy ending

Mrs. Maylie, the owner, and her adopted niece were moved to pity for the poor boy, whose innocence was plain to them; and Mr. Losborne, their great friend, managed to put the police off his track in a very clever way, being convinced that the boy was no willing party to the attempt on the house. When Oliver had recovered his strength somewhat, he told his whole story; and Mr. Losborne, who was a generous, impulsive gentleman, determined to punish Fagin and the others, and to find out Mr. Brownlow. Unhappily, Mr. Brownlow's house was empty, and to be let, when he took Oliver there to see him.

Oliver's new friends did not lose faith in him. When, as he sat at his lessons one day, he saw Bill Sikes and another man staring at him through the window, it was clear that some mischief was plotted against the boy, so friends brought him to London where they thought he would be out of danger. Now, poor Nancy, the companion of Bill Sikes, had always had a tender place in her heart for Oliver. It happened that she had overheard such words as would put Fagin and this other man, who went by the name of Monks, at the mercy of Oliver's friends, so when they were staying in London, poor Nancy went and told Rose Maylie all she knew.

The fate that overtook all the enemies of Oliver Twist

Thanks to the efforts of Mr. Losborne and Mr. Brownlow, who had now returned from a stay abroad and had met Oliver again, to the delight of both, the deep-laid plot against the orphan boy was, bit by bit, unfolded. The man named Monks was really the half-brother of Oliver, and his father's fortune had been left to be divided equally between him, his sister, and Oliver, on condition that Oliver never did anything to make his name dishonorable. Monks had employed Fagin,

who in turn employed Nancy and Bill Sikes, to make Oliver a thief; but, as we have seen, all their schemes failed. Mr. Bumble, who had married the matron of the workhouse, who knew part of the secret of Oliver's birth and told it to Monks, was, with his wife, made to confess what they knew. Monks admitted all, on being allowed to go free with half of what remained of the fortune, which he speedily squandered. But poor Nancy was killed by Sikes for having betrayed Fagin, and Sikes himself met his death in trying to escape from the roof of a house where he had been pursued.

Noah Claypole had in turn become one of Fagin's pupils and informed on him, so that Fagin was tried and executed at Newgate for his crimes. The Artful Dodger had before this been caught and "transported," as those were the days when many criminals were shipped from England to Botany Bay in Australia.

Not only was Oliver proved to have been an innocent and honorable boy through all his terrible temptations, and so worthy of what remained of his father's fortune, but in Rose Maylie, whom he loved dearly for all her goodness to him, he found a sister, as it turned out she was the sister of Monks. Rose married Mrs. Maylie's son Harry, who became a country parson; and Mrs. Maylie and Oliver went to live in the same village. Old Mr. Brownlow and his housekeeper also took up their home there; nor could Mr. Losborne bear to be separated from these good friends, so he moved there also. And Mr. Brownlow's friend, Mr. Grimwig, who once doubted Oliver's honesty, was a frequent visitor to the village.

THE FATE OF DOMBEY AND SON

MR. PAUL DOMBEY was a cold, hard, stern man; not at all the kind of man who loves children, and yet he wished to have a son of his own. The reason for this was that he was very rich and his whole interest lay in his business in the city; if he were to die without a son the firm would no longer be Dombey and Son, a name of which he was very proud. He had a sweet and gentle daughter of six years old, but he cared nothing at all for her, because a girl would not be able to keep up his great business. Now, Mr. Dombey had been married for ten years when two things happened to him which were of great importance to his life—a little Paul Dombey was born, and Mrs. Dombey died. Thus the event he had so longed and hoped for with joy was clouded with sorrow by the death of his wife.

THE LOVE OF FLORENCE DOMBEY FOR HER LITTLE BROTHER PAUL

Little Paul Dombey was an ailing child and from infancy he was delicate, needing the most loving care to keep his little life from flickering out altogether. It was a sad thing for him that his mother had died; but there were two people who loved him in very different ways—his money-loving father and his tender sister Florence. Indeed, his sister bestowed upon him all the love she had, for she was very lonely and her heart cried out to be loved. In return Paul thought there was no one like Florence, and could not bear to be separated from her for a day. Thus it was that when he was five, and the doctors had said that he should live by the sea in order to have as much of the invigorating air as possible, Florence went with him to Brighton.

PAUL DOMBEY'S SCHOOLDAYS WITH DR. BLIMBER AT BRIGHTON

Paul was sent to a school which was kept by a Dr. Blimber, and he had a very dull life for a boy of his age. There were ten other boys at this school, and Dr. Blimber was a most learned man, who made them all study so hard that they could think of nothing but their difficult tasks all day long, and had not enough spirit left in them to indulge in pillow-fights or other amusements of boys in boarding-schools. But Florence did all she could to help little Paul with his lessons, and the brother and sister were both happy at Brighton in their love for each other, when one day two visitors came to see Mr. Dombey, who was also staying at Brighton at that time. These two people were Captain Cuttle—an old sea-roving man with a hook instead of a hand attached to his right wrist—

and a good-looking young man who had lately come into the office of Dombey and Son. His name was Walter Gay, and he had met Florence before in a strange way. Once when Paul was a few months old his nurse became anxious to see her own children, but she lived in a poor district and was afraid to take Paul and Florence with her down the dirty, narrow streets.

How Florence Dombey first met Walter Gay

But at last her desire to see her own children grew so great that she went with Paul and Florence to her own house in Stagg's Gardens. As she was coming back again to Mr. Dombey's there was a panic in the streets; people were crying out, "Mad bull! Mad bull!" and running away. Florence was terrified, and in her alarm she lost sight of her nurse. In another minute Florence was "lost," not knowing where to turn, and a horrible old woman led her away down some narrow streets and took her to a miserable house, where she removed Florence's pretty dress, her shoes, and all her dainty clothes, and giving her some rags in their place, let her go away. It was then that Walter Gay had found her, and taking her to his uncle's, Solomon Gills' shop, brought her afterwards to her own home. From that day the two young people — for Walter was not much older than Florence — loved one another dearly and never forgot their adventure.

But on this occasion no one was lost; they had come, Captain Cuttle and Walter, to ask Mr. Dombey, who did not care for Walter, to lend them some money to rid them of a debt which poor old Solomon Gills was called upon to pay for a fault of Walter's father.

How little Paul made Captain Cuttle and Walter Gay happy

Mr. Dombey asked Paul what he would do if he had the money, and Paul at once said he would give it to them. He knew, although he was so young that money cannot provide the things that are dearest to us, and what he wanted most were his mother and his health; so that when he could make Walter happy with the money, he thought he was making the best use of it to allow him to take it as a present. Walter was also taken into the employment of Dombey and Son. Some time after this, however, Mr. Dombey's manager, whose name was James Carker, was talking with Mr. Dombey about sending a youth to their foreign office in the Barbados, and Walter was chosen to go, for neither of them liked him, and they wished him out of the London office.

The happy days of Paul and Florence were not to last for long. When Paul had been in Brighton for some time he seemed to grow weaker instead of stronger. Florence and he clung to one another all the more as Paul's life seemed flickering out, yet not all the care in the world could save him, and he died with his arms round his dear sister's neck. Mr. Dombey's grief was very great, but it came from pride rather than real love of his son, as the cause of his sorrow was the thought that Dombey and Son would not be the name of his firm in the future.

Before very long Mr. Dombey met a beautiful but cold, proud, and stately young widow, named Edith Granger. She had been brought up by a hard-hearted mother, who cared for nothing but money and pleasure; so that when this wealthy gentleman wished to make her his wife, she thought she would be better with him than living in poverty.

Mr. Dombey's second marriage and what came of it

Of course, as neither of them really loved the other, their marriage could scarcely be a happy one. Mr. Dombey thought that his bride's dignified figure and stately grace would look well at the head of his table, while she herself thought that his money would buy her fine clothes and jewels. Yet sleeping in her heart was the wish to be loved and to possess the loving nature which might have been hers but for her upbringing, and she soon grew very fond of lonely Florence, trying her best to fill her mother's place and console her for the loss of her beloved brother Paul.

Mr. Carker, whom we met before when Walter's future was decided, was a very wicked man. He was trusted thoroughly by Mr. Dombey, whom he pretended to respect greatly, yet all the while he was plotting and planning to bring about his downfall. He thought that the easiest way to harm him was to raise up strife between the husband and wife. Overhearing the newly married couple quarreling because Mrs.

Dombey had been indifferent and haughty to her husband's wealthy friends, Carker, in his sly way, induced Mr. Dombey to try to break his wife's pride. He was made the messenger of Mr. Dombey to tell Edith that she was not to show so much affection for Florence—now about seventeen or eighteen, and a very pretty girl—as it made too great a contrast between her feelings for her husband and her stepchild.

MRS. DOMBEY LEAVES HER HUSBAND AND POOR FLORENCE IS DRIVEN FROM HOME

At length Edith could no longer endure the insults put upon her pride even before the deceitful Mr. Carker and Florence, and one night she took off and threw down the diamond bracelets from her arms, the jewels from her hair, and, treading on them, told her husband she could no longer live with him. She did not even say good-bye to her stepdaughter and before anyone knew exactly what had happened she was gone.

Florence, though so often repulsed by him, still loved her father, and wished to comfort him in his sorrow. She ran to him, crying out, "Oh, dear, dear papa!" and held out her arms to him; but he struck her cruelly and told her to follow her stepmother. There was now for the poor girl neither father, mother, brother, nor home, and in her trouble she could think of but one place to which she might go; this was to the shop which had been kept by the uncle of her dear friend Walter Gay.

While sorrow had come to this great house of Dombey, it had not left alone the humble home of Walter Gay. The ship on which he had sailed was a wreck, and the old uncle had left his shop to seek for his nephew, if he were alive, so that when Florence reached the shop she was met by Captain Cuttle.

FLORENCE DOMBEY FINDS A GOOD FRIEND IN OLD CAPTAIN CUTTLE

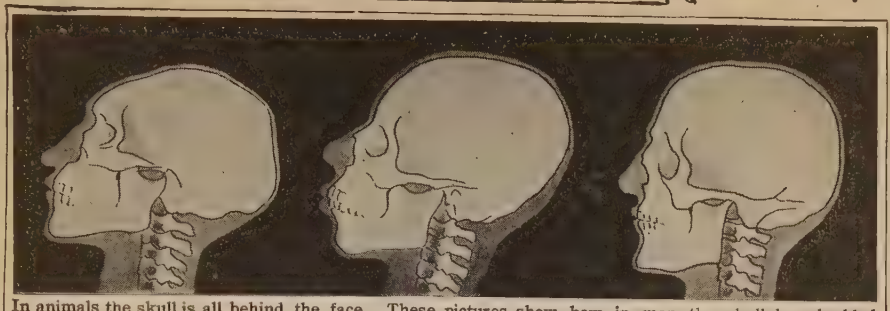
Greatly delighted he was to see her, carefully he prepared the bed in Walter's old room for her, and he accompanied her whenever she went out shopping. His one disappointment was that she would take no money from him for her little needs, as she had some money of her own. Then Captain Cuttle one night told her a wonderful story of a brave boy who had sailed abroad, been wrecked, but by a miraculous chance had been saved after much tossing on the angry sea. Before he could say much more a bright-faced young man was beside her. It was Walter Gay, whom she had loved as though he had been a brother. You may imagine what a happy meeting this was, and how many happy days were to follow in which the young people grew to love each other more and more dearly, until at last it was decided he should become even more to her than a brother, and before long they were married.

In the meantime Mrs. Dombey had fled to France, and there she met Mr. Carker. Mr. Dombey followed them, and Edith had scarcely had time to tell Mr. Carker of her great hatred for him when he found that his former master had tracked him out. By coach he made his way for days towards the coast of France, his pursuer following him closely. At length Mr. Dombey overtook him, but while he was stepping aside to elude his pursuer, Mr. Carker fell on the railway track, the great engine was upon him, and crushed him to death. So perished this wicked man, though even yet his influence for evil was to continue. When Mr. Dombey reached his home he discovered that he was ruined, that Mr. Carker, in whom he had so greatly trusted, had been for years robbing him of his money.

FLORENCE FORGIVES HER FATHER AND MAKES HIM HAPPY IN HIS OLD AGE

Now, though it may seem that Mr. Dombey deserved all his troubles for his cruelty, Florence's heart went out to the father who had never been kind to her. As he sat alone the night before he was to leave his fine house, thinking about his past, there came to him in his loneliness one whom he had never pitied in her loneliness, and the loving arms of his little Florence were clinging to him. She begged him to forgive her for having left him, and told him of her marriage. Then she made him even more happy by telling him that she had a little son, whom she had called Paul, and that he was like the child of whom they had once been so fond. So, though the firm of Dombey and Son, which had once been his pride, almost his worship, was now no longer in existence, the old man at last found true happiness in the love of his daughter and her little children, Paul and Florence.

THE NEXT STORIES OF FAMOUS BOOKS ARE ON 2669.



In animals the skull is all behind the face. These pictures show how in man the skull has doubled over in front to make room for the brain. The first is the skull of an Australian native, the lowest type of man, the second of a negro, and the third of a European, the highest type of man,

THE HEAD AND THE LIMBS

CONTINUED FROM 2468

WE have read about the bones in general and their services to the body, and especially we discussed the backbone, upon which the whole body is built; and we saw that it is specially curved in human beings, so that after the baby stage, we walk erect. Now, upon this backbone there is beautifully poised the head; and this contains the brain, where *we ourselves* really live, and from which issue the orders to the limbs, whereby our living and willing show themselves. The orders to the lower limbs, or legs, take us where we wish to be, and the orders to the upper limbs, or arms, enable us to do what we wish when we have got there. Now we must study the head.

If we look at a very humble backboned animal, like the fish, or even at a much higher one, far nearer to ourselves, such as the dog, we see at once that the head is made of two parts. In front there is a part which is thrust forward, which we call the face. Its great business is to carry the most important organs of the senses—the eyes and the nose—much more important than the ears, which in the fish are very poor—and also to provide openings for the air—in the case of the dog—and another for the food to enter the body. Look at a greyhound, and you will see what I mean. And *behind* the face there is the other part of the head. This is rounded and rather large, and we call it the skull. It is the most important part of the whole skeleton, for it contains the brain. The brain of a fish is very small indeed, and its skull is small also; in the dog the brain is much larger, and so its skull is quite conspicuous. In the animals which come nearer to ourselves, the higher monkeys—usually called the man-like apes—the brain and the skull are much larger than in the dog. But even in the highest apes the skull is still *behind* the face.

Now, in ourselves the brain is really *enormous* compared with the brain of any animal, and room has had to be found somewhere for this great brain, which is, more than all things else, the thing which distinguishes our bodies from those of any animal. Room has partly been found sideways, so that our skulls stand out sideways from the neck very markedly. But the wonderful development of the brain in ourselves is by far the most marked in one particular part of it, which is its topmost part—topmost both because it is actually at the top, and because it does the highest kind of work, which is thinking. This topmost part of the brain has grown so large and so high that it has doubled over upon itself *forwards*, instead of standing straight up; and therefore the skull

of mankind has had to grow forward to hold it. This means that the skull, which in the animals is entirely *behind* the face, has now grown over the face; and if we look at any man, woman, or child, we see at once something which shows this, the like of which cannot be found in any animal on earth, and that is the great forehead, the part of the head that—in every sense of the words—has "come to the fore," as we say. So while we still have a great expanse of skull behind our faces, like all animals that have skulls at all, we have a great part—and that the most important of all, as it holds the highest and most *human* part of the brain—placed above the face. The whole growth and development of the body, as well as everything else, depends upon the brain; and so, if we look at a very young baby, we find that, though its brain has yet such a lot to learn, it is larger in proportion than any other part of its body, including its face.

A REMARKABLE THING ABOUT A BABY WHEN IT IS BORN

So, in a baby, the face seems rather absurdly small, tucked away "anyhow" *under* the big skull, which is actually the widest part of the whole body of a baby. If we look at ourselves and see how narrow the head is compared with the shoulders or the hips, we can scarcely believe that, when we were first born, the head was wider than either. But so it was, and so it has to be to hold a brain big enough to control and direct successfully the growth and development of the little baby's body, which cannot even sit up, much less stand, until it becomes the wonder and the master of the world.

We find that some parts of the earth are inhabited by a very humble kind of men and women, who not merely know less than we do, but are not able to learn as much as we do, even when they get an equal chance; and we notice that these people do not have high and broad and straight foreheads, as we do, but that their foreheads are low and narrow, and slope very sharply backwards, almost suggesting the humbler forehead of a dog. We have no more right to despise these people than we have to despise any other creature that God has made. To do so is to despise God. But we must understand that they are less able to look after themselves and to protect themselves from evil things than we are, just because their brains are not so large as ours; and *therefore* a special duty falls on us, who have larger and better developed brains, to do right to these people, and not, for instance, to get rich by making slaves of them or to make slaves of them by selling to them alcoholic liquors which are unfit for any human being, or even a dog, to drink.

THE BRAIN IN ITS HOUSE AS STRONG AS A ROCK

If we understand how important the brain is, and that the skull is its house, we shall think it worth while to study the skull rather carefully. First of all, just a word as to its base, or under-surface. If we look at it, we notice two things. The first is that it is very strong, very thick, and made, in its greater part, of the densest and hardest bone in the whole body. Part of it is, indeed, called the *petrous* bone, from the Greek word for a rock, because it is so hard and strong. We use this same word when we say that a thing is petrified, or turned into a stony rock, and it is used in the Bible, where Simon was named Peter, the *rock*. The reason why the base of the skull is so tremendously strong is because of the great shocks it always has to bear. Every step we take—and far more so when we run or jump—means that a great shock runs up our legs, along the backbone, and so reaches the base of the skull. If this were not so strong as it is, it could not stand these constant shocks. As it is, only the most terrible accident will break it, and usually it is unbroken even when a man has had some awful fall from a height.

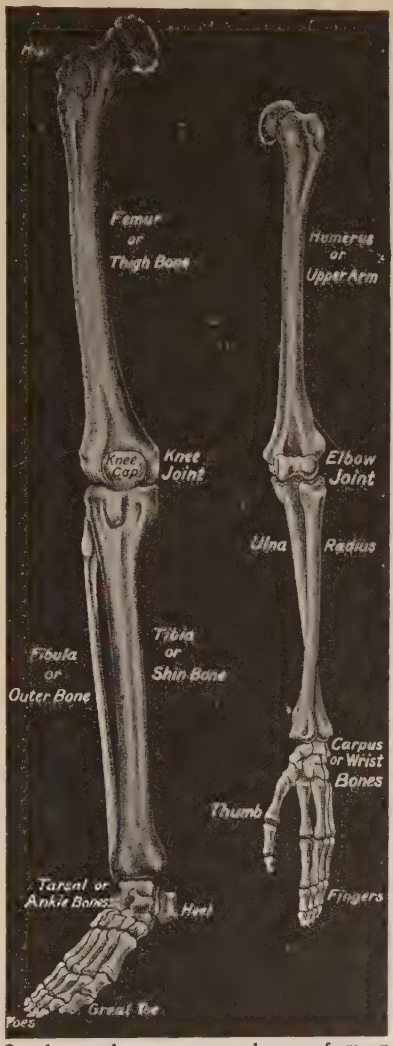
THE GREAT WONDER OF THE SKULL AND THE BRAIN

The second thing we notice about the base of the skull is that it is pierced with holes, small and large. They are so many and so confusing that it takes months to know them all—and then you forget most of them in a week! But there is one that nobody can forget, and that is the great hole we have already mentioned, through which the brain joins with, or runs into, the spinal cord. The other holes exist partly for blood-vessels to enter the skull and supply the brain with air and food, for veins to carry the used-up blood away from the brain, and for a host of nerves to travel to and from the

brain, and connect it with the face, the tongue, the lips, the nose, the eyes, the ears, the voice-box, and many other very important parts of the body.

Only in one or two places do we find that the brain rests upon a floor of bone which does not protect it thoroughly. The wall of the space which holds the eye-ball is, however, one of these places. It is possible for such a thing as the point of an umbrella very easily to pierce this thin plate of bone and so enter the brain at one of its most important parts. But the danger is not nearly so great as we might think; first, because the eye is greatly protected by the bony ring round it, so that a pointed thing must enter very straight if it is to pierce to the brain; and, secondly, because the eye itself is such a quick and sure guardian of its own safety, and can so rapidly, when it sees itself in danger, suggest to the brain that orders shall be given for the quick movement of the head to one side or the other.

The great vault of the skull is composed of a very special kind of bones. These bones are thin and beautifully curved, and they are most exactly jointed to one another. These are among the few cases in the body where bones are jointed together, but are *not* meant to move at these joints. This is the general rule in the head, and the only exceptions to it are the joints where the lower jaw hangs from the head, and the joints of certain tiny little bones inside the ears, which carry the sound waves from outside on their way to the nerves of hearing. The bones forming the vault of the skull will always break sooner than be disjointed from one another, or dislocated, as we say.

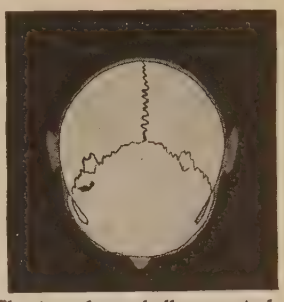


Our legs and arms are made up of many bones, and here we see what these are like, and their names. The knee-joint is the most wonderful joint in the body, but is more easily injured than any other. The bones of the legs and arms are much alike, but the leg has an extra bone — the knee-cap.

These bony plates are remarkable, because they are *not* formed from gristle or cartilage, as most bones are, but from sheets of a fibrous material or membrane. When a baby is born, and for a long time afterwards, there are at least two places in its skull where this membrane has not been changed into bone, and where we can feel a "soft place." One of these is much bigger than the other, and most of us have been allowed, perhaps, very gently just to touch this soft place on the top of a baby's head. We can imagine how risky the existence of the brain would be if all its covering were made of a soft membrane, instead of good, firm bones. This soft place was long ago called the "little fountain" by the Italians. Sometimes, if we look at it, or lightly rest a finger on it—it is easy to find on a baby's head—we can see or feel it quickly rising and falling, rather like a fountain. The reason is that at every beat of the heart the brain and skull are filled with a little more blood than is in them between the beats, and this raises the brain a little at each heart-beat under our finger. Sometimes a baby's pulse can be felt here when it cannot be felt anywhere else. Now,

if you have a little baby brother or sister, I don't want you, after reading this, to try to feel the little fountain for yourself, for you might press rather too hard, and babies are not born for us to try experiments on; but I want you to understand why every good mother or nurse is particularly careful to protect the head of a little baby from any injury.

We find that each of the bony pieces that make up the vault of the skull is gradually turned into bone from a point right in the centre of the piece of membrane that corresponds to it, and was there first. Even in the head of a fully grown-up person these places can be felt as "bumps," for the bone is a little thicker there than it is anywhere else. If we could see the brain underneath, we should find no "bumps" in it to correspond at all to these bumps on the skull—they are merely places where the bone is a little thicker than usual. So it is utter nonsense and rubbish for this one reason, as well as for scores of other reasons, to pretend to tell anybody's character and future by feeling the bumps of his skull.



The top of our skull seems to be one bone, but is really several bones, dovetailed together, as seen here. It is easier to break the skull than to disjoint the bones.

You will be able to feel five bumps at least on your own head. On each side of the forehead there is one, just at the "corner," as we might say. Then, at the opposite corners of the head—as if the top of the head were a flat, oblong thing — there are two others, and these are the places where the side bones of the skull started to be made. And in the middle line of the skull, behind and low down, is the sharpest bump of all. This is of a quite different kind, though it is a true bony bump. It is a sharp piece of bone, meant to hold the muscles and strong elastic fibres of the back of the neck, which hold up the head and prevent the chin from falling on the chest, as it does when anyone is very sleepy, and his brain forgets to tell the muscles at the back of his neck to keep on pulling.

The skull of a human being is, however, very smooth indeed compared with some skulls. The skull of a cat or a tiger has many great ridges and crests and bosses of bone on it. The reason is that the tiger lives largely by the strength of its jaws. These need very large muscles to work them, and the muscles need large bosses and crests of bone on the skull for them to hold on to. Men are more muscular than women, and so, even in men, though their jaws are very weak compared with the tiger's, the skull is rougher than in women. A woman's skull is lighter and smoother and more rounded than a man's. It is also smaller, and holds a smaller brain. But a woman's brain is quite as big as a man's in proportion to the size of the body it has to look after. That fact is not known by the kind of men who are always despising women—probably because those men's own brains are too small for them to learn much.

The only bones of the face that are very important are the jaws, which hold the teeth, and we have learned something about them already; so now we can pass on to the bones of the limbs. We have seen already that the limbs of all the back-boned animals that have limbs are made on the same principle, and to describe the bones of any one of them is to describe, almost exactly, the bones of any other. Perhaps the collar-bone differs most of any, but it is big in ourselves, and in those creatures which use their upper or fore limbs at all as we do. We need say no more about it, except that it lies very near the surface of the body, as we all know, and that it is very apt to be broken by a bad fall on the arm or shoulder.

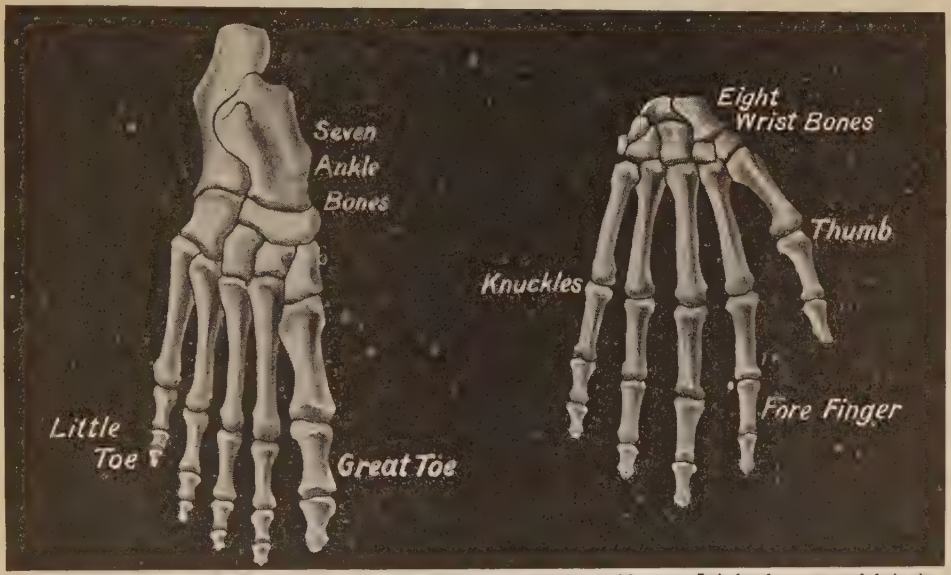
We can move a finger in only one or two directions, but this section of the hip-joint shows the ball-and-socket plan which lets us move our legs in all directions.

Much more important is the shoulder-blade, the great ridge on the back of which can be felt in anyone. It is mainly a rather flat bone, lying nicely

moulded upon some of the upper ribs. The most important part of it is a rounded socket into which fits the head of the bone of the upper arm. This makes a "ball-and-socket" joint, and the great feature of a ball-and-socket joint in a piece of machinery, and in our bodies, which are so much older than lifeless machinery—and have, of course, made all the lifeless machinery there is—is that it can move in any direction. You can move a finger-joint or the knee-joint in only one or two directions; but the shoulder-joint, and the hip-joint, which corresponds to it, are ball-and-socket joints—a very good thing for us.

jointed. Beyond the wrist we find five little long bones (of course, you see why we call them long, though they are so little); and the first of these has *two* bones beyond it, making the thumb, while the other four have each *three* bones beyond them, making the four fingers. We sometimes talk of thumb and four fingers, and sometimes of five fingers, as when we say "five-finger exercises" for the piano; and it is rather confusing.

Everyone can see for himself or herself that the thumb has one piece of bone less than the other four parts into which the arm is split at its end. But have you



These are the bones of the foot and hand, each with the same number of bones. It is by the power of bringing the thumb opposite the fingers, which no other creature possesses, that man can make such wonderful things.

Perhaps you may care to remember that the bone of the upper arm is called the *humerus*, not "humorous," remember. Some people say it is called that because it is near the "funny bone," but of course that is only a joke.

The forearm has two bones; they lie side by side when we stretch out the arm with the palm of the hand uppermost. When we turn the hand over on to the palm, the outer bone crosses over the inner bone. At the elbow both bones are jointed to the humerus, and a very wonderful joint that is, though not so wonderful as the knee, which, of course, corresponds to it.

Then comes the clever wrist, with its eight little pieces of bone all wonderfully

noticed that the same is true of your great toe?

In some creatures the fingers or toes are webbed; in the duck, for instance. But have you noticed that our fingers are partly webbed, too? Lay your hand on its back, and look at the length of the fingers, and then lay it back upwards, and look at their length again. Then you see that our fingers are a little webbed on the palm side. That makes the palm a little bigger, and helps to prevent things from slipping out of it between the fingers. The toes have the same arrangement.

A whole book, and a very famous one, too, has been written about the wonders of the human hand. Here we can only notice the greatest of them. It is that

the thumb can be *opposed* to the fingers, so that it is quite easy to touch the tip of the little finger with the tip of the thumb. The importance of this for the life of mankind is *enormous*. It means easy grasping, and that means *writing*, and many more things. In all the animals, except in those which are nearest to us, the thumb is not *opposable* any more than the great toe is in us, though the great toe is opposable in some animals, so that they can use their feet as well as their hands in climbing.

We have already read about the ribs and the breast-bone; so now we can pass to the last part of the skeleton, and that is the bones of the lower limbs, or legs.

Just as in the case of the arms there are certain bones that lie between the backbone and the long bones of the limb itself, so in the lower limbs we find certain bones of very great strength and importance, which are firmly jointed together to form a sort of basin. This is called the *pelvis*, which means basin. It is built round the lower part of the backbone; and you can feel the edge of the basin in your side.

THE HIP-JOINT WHICH IS POWERFUL ENOUGH TO RESIST ALMOST ANY SHOCK

On each side of this basin, outside it, we find a very deep and very strong socket for the head of the hip-bone to fit into. This is very many times stronger than the socket the upper arm-bone fits into, because the hip-joint has to do with walking, and its strength has to be tremendous. It will stand very nearly anything before it will allow itself to be disjointed.

The thigh-bone, corresponding to the upper arm-bone, is the longest, biggest, and strongest in the body, and at its lower end is the knee-joint, the largest and most wonderful joint in the body, though, unfortunately, not quite perfectly fitted yet for a creature that walks upright, and therefore it is very apt to undergo injuries, and terribly liable to be attacked by disease.

The part of the leg below the knee has two long bones in it, like the forearm. But it is not necessary, or even desirable, that we should be able to turn the lower part of the leg right round, as we can do with our arms; and so only *one* of the two bones of the leg is jointed to the thigh-bone. That is the shin-bone. The other one, which lies along its outer side, is very slender, and its upper end is simply jointed to the large and strong upper end of the shin-bone. You can feel the little head of this outer bone in your own leg, lying well below the knee-joint itself.

THE EXTRA BONE OF THE LEG THAT IS EMBEDDED IN MUSCLE

The leg also has an *extra* bone, the knee-cap; but this is quite peculiar, as we should expect when we remember that there is nothing of the sort over the elbow-joint. The knee-cap is a bone developed inside the strong rope, as we may call it, of the muscles of the thigh, as they pull upon the shin-bone. This rope, as it passes over the knee-joint, has the knee-cap embedded in it.

The bones of the ankle differ from those of the wrist, as they have such different work to do; and the most notable is the bone of the heel, on which such great strain falls when we stand or walk. But more remarkable than any one bone is the way in which the ankle-bones form an arch, which gives spring and grace to the gait. This arch is beautifully supported by the rope, or sinew, of one of the muscles on the outside of the leg, for this sinew runs right under the ankle and braces it up. Another sinew on the inner side does much the same, and the two together form a sort of stirrup to support the arch of the foot. If the muscles get flabby and weak, the sinews get lax and the foot is apt to become flat.

THE GREAT TOE JOINT AND HOW IT IS TWISTED OUT OF SHAPE BY OUR BOOTS

The bones of the foot exactly correspond to those of the hand. The foot, lastly, contains the most constantly abused joint in the body—the joint of the great toe. The bones of the foot are so arranged that the inner edge of the foot is meant to be straight, as it always is in a baby; and the great toe should move up and down in a straight line pointing forwards. We wear boots and shoes which turn the great toe outwards, and compel its joint to work thus twisted out of shape. People who have gout know the result—which is that this poor joint is more liable to cause intense pain and suffering than any other joint that we have in the body. The fault is not the joint's, but ours.

THE NEXT PART OF THIS IS ON PAGE 2647.

WHAT THIS STORY TELLS US

NO subject is more interesting to boys than the story of the Indians. Here you will find an account of the Indians of Canada in early times, their appearance, their daily life, their sports and games, their religion and superstitions and their methods of warfare. Though their numbers are much less than two hundred years ago, there are many Indians yet living in Canada. Thousands of the children are in school and seem to be making excellent progress. Some are becoming prosperous, especially those who live in the Province of Ontario, though generally they dislike to work continuously at any task.

THE INDIANS OF CANADA

PART I

CONTINUED FROM 2506

THE term Indian was first applied to the natives of North America by Columbus. When he reached the Bahamas in 1492, he believed that he was near the shores of India, and he named the people he saw there Indians. Since that time the term has been used to designate the first inhabitants of America. When the first explorers and discoverers came to Canada, in the early part of the sixteenth century, they met with various Indian tribes or nations. Each tribe was a small republic in itself, presided over by a chief, whose power depended on the opinion the members of the tribe held of his strength and skill and wisdom. The most important peoples in Canada were the Algonquins and the Iroquois. The former was the chief central race of early Canada, and extended in scattered masses from the Atlantic Ocean to Lake Winnipeg, and from North Carolina to Hudson Bay; the latter lived in the territory now included in Ontario and Quebec, and also in what is now New York and North Carolina. Next in importance were the Hurons, though they seem to have been of the same stock as the Iroquois. These three divisions were the first with which our ancestors came into contact.

WHAT THE INDIANS WERE LIKE WHEN OUR ANCESTORS CAME

Although each tribe had its own peculiar characteristics, on the whole the methods and habits of all were similar, and many customs and traits were common to all. The early Canadian Indians were tall and straight and slender and agile in form, with dark olive-colored skin bronzed by exposure to the weather. Their expression was always stern and sombre, and seldom gave evidence of their true feelings. The cheek-bones were high, the eyes small and keen; the forehead was narrow, the lips thick, the nose flat, the hair very black, long and coarse. Their senses of sight and hearing were very highly developed, so highly that they impressed the first European explorers as having almost supernatural power.

When the white men came to Canada, the Indians dwelt in small roughly built lodges or huts. The less advanced tribes lived in movable wigwams or tents shaped like a cone or bell. These were built of ten or twelve poles of varied length, according to the height of the tent; the poles were fastened at the top, and stretched on the ground in a circular shape; a covering of bark or skins of animals was then placed on the outside of the poles, fastened with pegs, and weighted to the ground with stones. A hole large enough to let a man enter on hands and knees served as an entrance, and a flap of skin or bark made the door. The smoke of the fire passed out through an opening in the top of the tent. Many Indians to-day—particularly in summer—live in wigwams similarly constructed.

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How the Indians dressed when the white man came

The clothing of the Indians was made from the skins of animals killed in the chase. At a very early period they discovered the art of dressing or tanning skins. In their dress they always showed a love for adornment, and this characteristic still remains with them. Their garments were highly decorated with paint or dye made from plants or berries, and with bright-colored shells. Their faces and bodies were frequently daubed with paint, especially before setting out to war. The braves, and the other important men of the tribe, decked their heads with the feathers of the hawk and the eagle, and both men and women wore ear-rings and bracelets made of bone or shell, teeth of the deer, claws of the bear, or other parts of wild animals. They were quite skilful in ornamenting their deerskin garments with the quills of the porcupine.

Before the coming of the white men, the only weapons the Indian possessed were the arrow, the tomahawk, and a kind of knife or battle-axe. The arrows were tipped with stone heads, and the tomahawk, the knife, and the axe were of stone. Specimens of these old weapons are seen to-day in museums, and are sometimes dug out of the ground on the site of old Indian encampments. They were made in the same way that our ancestors of the stone age made their weapons and tools of stone, when they lived in caves in Great Britain and in Southern France and in Spain.

Wars between the tribes were of frequent occurrence. These arose from an invasion by one tribe of the territory belonging to another, or from the capture or slaying by one tribe of a member of another.

Indian methods of fighting before they obtained firearms

When it was decided at a council of the braves to go to war, weapons and garments were carefully prepared. The bodies were painted in a hideous fashion; dances and feasts were held to propitiate the gods to give them success; there was much boasting of their valor by the older men in order to put courage into the young and untried warriors. Although under a war chief or leader, the warriors fought independently. They fought with clubs, and spears, and arrows. Open fighting, however, was not always in their code; they trusted rather in a secret and sudden surprise, and from an ambush behind rocks and trees their arrows came silently, as if from the sky, upon their unsuspecting foes. The scalp of the fallen enemy was removed and treasured as a trophy of victory, and the power and skill of a brave was measured by the number of scalps in his wigwam. Sometimes the skulls of victims were likewise treasured. When the warriors returned from the battle, feasting was renewed, the scalps of the slain were stuck on poles, and the tribe danced the weird scalp dance to the noise of the "tom-toms" or drums beaten by the squaws; if they had brought back prisoners, there followed the terrible tortures of the captives, who seem always to have borne their suffering with stoic calm. Sometimes women of the tribe who had lost their own children took pity on captives, adopted them, and made them members of the tribe. Thrilling stories are told of white children, and even grown men and women who were adopted and afterwards escaped. Sometimes children who were carried off by Indians in early youth grew to love the wild life and refused to return to their friends.

How the Indians got their living

The chief occupation of the Indians was hunting or fishing, but these pursuits were followed only at intervals, and long enough merely to provide food. In the wild, free country where game was abundant, the Indian could kill an animal or catch fish for his meal without difficulty, and as a result he gave little thought to the future. He lived from "hand to mouth," for his food was always near,—in stream or forest. He has never outgrown this characteristic. To capture wild animals he had primitive traps; he used also his arrow and his spear. For crossing the snow-covered fields, either of forest, wood or prairie, he used snow-shoes,—a broad frame covered with a network of leather thongs which kept him from sinking in the snow. On these, which he used with great skill, he easily caught the deer and the buffalo floundering in the deep snow, and killed them with his club or hunting knife. From the bank of the stream he speared fish; sometimes at night he placed a birch-bark torch-light in the bow of his canoe,

INDIANS WHO LIVE MUCH AS THEIR ANCESTORS DID

Though this is a modern picture the "traverse," as this clumsy carriage is called, was used by the Indians as soon as they gained possession of horses, which was not until after the white men came. The horse is fastened between two poles, the ends of which drag on the ground. This is Kenepequoshes (Son of a Snake), a Cree Indian, with his squaw and papoose, at their home in Alberta.

The surviving Blackfoot or Blackfeet Indians are found both in Canada and the United States, and this picture made on the Canadian side shows how they live. Their tepees are usually covered with canvas, and to the left you can see the framework of one from which the covering has been removed. Their horses are grazing on the prairie. The origin of their peculiar name is not certainly known.

Photographs by Notman, Montreal.

and when the fish, as they always do, rose to the light, he easily speared them. In the autumn, before the Indians settled in their winter quarters, the great annual hunt was held. The meat of the animals was smoked or dried in the sun and put away for use on days when the weather would not permit hunting. Great quantities of fish were cured in the same way, and on the Atlantic coast, in the Maritime Provinces, shell fish—oysters and clams—were piled on the shore in great heaps for winter use by the tribe. Remains of these are still found in many places.

The people generally shared alike, and there was little or no individual ownership other than of personal belongings. Some of the more advanced tribes cultivated Indian corn in little garden plots; from the meal or millet of the corn, which they ground between stones, they made a coarse bread, and this frequently saved them from distress in the absence of game. By drilling with sharp-pointed sticks or striking sparks from two flint stones, which they always carried, they lighted the inflammable birch-bark or punk and kindled fires. This was difficult except in the hands of skilful fire makers, and fire was usually carried with care by the old women from one place of encampment to another. Their utensils—the few they possessed—were of stone, and some very good specimens of their pottery are still found in different parts of Canada. Buckets or cups were made from birch-bark or leather. Most of the meat was cooked. It was boiled or roasted on "spits" or sticks in the fire. Birds were roasted or baked in a bed of ashes or live coals; a common method of baking was to enclose the bird or the meat in a ball of clay and then place the ball in a bed of hot ashes. Eggs were boiled or baked in ashes. Cereals were boiled or roasted or parched, and corn was roasted on the ear. Water was heated by ordinary methods or by putting into it numerous stones made red hot in the fire; the birch-bark vessel would be scorched, but would not be burned when put over the fire with the water already in, if the fire was a bed of live coals.

Some customs which seem strange to us

The Indians had many strange methods and customs, a few of which they still retain. The mother carried her infant child on her back; she placed him in a moss-bag made of fine clean moss, wrapped the bag in a small blanket or skin ornamented with shells or colors, and fastened it to her shoulders. Boys were much more welcome than girls because they could become warriors and fight. Children were seldom, if ever, punished for wrong-doing; but they were—and are still—very obedient, and had great respect for their elders. The father's word was always law in the household.

Funeral customs differed in detail among different tribes, but there were many that were common to all. The burning of the bodies was practised among some of the tribes. Among others, the body was wrapped in a blanket or a hide, and placed in the crotch of a tree, or on a scaffold several feet high, where the wild beasts could not disturb it; there it was left, and the spirit of the wind or the storm was given charge over it. It is said that they believed that the rain falling from the heavens would cleanse it from its sins, and hasten its arrival in the Happy Hunting Grounds. Indians who practised this custom held a Feast of the Dead, once in twelve years, when bodies were brought from far and near and buried in one large grave. The grave was lined with new robes and beaver skins and gifts to the dead were buried with them. Sometimes a hollow log was used as a coffin. Other tribes placed their dead in strongly built stone huts,—the houses of the dead,—securely fastened against the beasts of the forest. These were placed at a considerable distance from the village, that the spirits of the dead might not harm their enemies in the tribe. To these huts came to visit at times the relatives or friends of the departed, for the spirit was supposed to linger there; sometimes highly prized trinkets or possessions were left there to make the dead happy. The remains of these huts containing bones or skeletons are still found.

Remains of the mound-builders, an ancient Indian race

In the region to the west of Lake Superior, and in the central Northwest, there are many mounds which tell of the old Indian race. They are built of earth, but sometimes contain layers of stone and wood. Usually they are circular in shape, from six to fifty feet high, and from thirty to one hundred feet in diameter. They are generally found on cliffs or other

points of vantage, and while they were perhaps used at first for purposes of observation or defence, they were also undoubtedly used as burial places for the builders. They usually contain skeletons, most of them in a sitting posture; others contain the dust of skulls and bones. A chief or a man powerful in the tribe was always buried on an eminence or in a secluded spot, selected apparently for its beauty and impressiveness. The Indians always placed beside their dead many things they thought would be of use in the great Spirit Land to which the dead had gone; these included various articles of food, tobacco and pipe, bow and arrows and other weapons and utensils, some of the treasures of the deceased, his dog, and gifts from friends. They believed that the dead were happy, and that the Spirit Land was a place without pain or hunger or weariness.

Some again thought that the place to which the dead had gone was a land of "little people,"— a land of the ever-young, — where the spirits were always at play and none ever grew old. Some of the Blackfeet of Alberta still believe that the spirits of the dead exist somewhere near the Sand Hills. To them the future life is one not of happiness, but of indifference. The people of the Spirit Land, they think, lead the life of ghosts, and are surrounded by illusions. For example, they are always hunting buffalo or other animals, which, followed for a while and almost captured, suddenly vanish and leave behind in their place for the hunters only skeletons of little mice.

THE RELIGIOUS BELIEFS OF THE INDIANS

The religious beliefs of the Indians were strange, and they varied but slightly among the different tribes. They all worshiped something, the spirit of good or of evil, the spirit of the day or the night, sun or moon or stars, the spirit of the storm, or of the mountains, or of the water,— the lake, the sea or the river. Usually they believed in one great good spirit, whom they called "Manitou," — the "good Manitou," — and one great evil spirit, — the "evil Manitou." But each man frequently had his own god whom he worshiped in silence and secrecy. All the tribes had their own peculiar stories of the creation of the world, and the origin of man and of animals was explained in strange ways.

They also had tales of a great deliverer who came to clear the forests and the rivers and the fishing grounds, to free the world from evil, and to teach the arts of peace. Among some of the tribes, this great personage was looked upon as the creator of the world and everything it contained. The imaginative minds of the Indians led them very far in superstition. Every sound in the forest, every call of bird or animal, every ripple of stream, or moan of wind, or creak of tree, or rustle of leaf was to them a voice speaking of good or evil fortune to come. Giants and monsters, good or evil, peopled the earth and the water and were lords of part of it. Some tribes believed in the existence of "little people," like fairies, who lived among the hills or trees, and had great power of good or evil over mankind. Some could not eat certain kinds of flesh, because they believed they were descended from the particular animal the flesh of which was thus prohibited. The fiercer the animal ancestor, the greater was the courage of the descendant. Many of these old beliefs still linger among the Indians to-day.

THE SUN DANCE AND ANIMAL WORSHIP

Among the tribes of Western Canada, the great religious rite was the Sun Dance, for the worship of the power of the sun was one of the chief elements in their religion. In this dance the whole tribe took part. Sometimes during the "dance" young braves were raised to the rank of warriors; this was done by piercing the muscles of the chest, tying thongs through the opening, and lifting the youth above the crowd; if he endured this painful test, he was henceforth called a warrior. Sacrifices to animals were not uncommon among some tribes, in order that some of the animal's power might be transmitted to man. As the Indian looked about him, he saw animals possessing power that would be very useful to him, and he thought that by offering sacrifices and prayers he might receive some of that power. For example, he saw that the owl had great power over darkness, and could see in the blackest night; he sometimes made sacrifices and prayers to the spirit of the owl, hoping that some of this power might be transmitted to himself by this act. He did the same with the sun and the moon.

THE NEXT STORY OF CANADA IS IN NEXT VOLUME.

INDIANS OF THE FAR NORTH

The Indians of the far North are fishermen, hunters and trappers. During the winter they live farther south and west, but move up into the Hudson Bay region in the summer to fish and hunt the caribou. Some of them engage in trapping. You see by the wigwam that they have no permanent homes. You get a better view than usual of a bark canoe, which is light to carry.

Here is a whole family landing at their summer home. Unfortunately the white man's clothes destroy the picturesqueness of the Indian. Though they are on Hudson Bay the climate is not cold in the summer, but is really very pleasant. When the frost comes they will fold their wigwams and move toward the South, where they will remain during the long winter. Sometimes they have trouble in finding enough to eat.

PLANTS ANYWHERE AT ANY TIME

CONTINUED FROM 2523

WHEN the days are fine and bright, there will always be plenty to do in the piece of garden which is one's very own. In rainy weather, and during the winter, those of us who love to grow plants seem to be separated for a while from our treasures. There is no reason why this should be so, for, with a little care, we may easily have an indoor garden that we can enjoy all the year round.

Now, most plants, of course, grow in soil; but there are a certain number which may be kept alive without any earth at all, if they can have plenty of fresh water. These plants are just what are wanted for an indoor garden, as there is no need to use any mold, which is dirty stuff to have in the house.

The best plan for the garden without soil is to get permission to use a table or a shelf near to a window; and in order to prevent the water from spilling on the floor, it is just as well to have one or two large trays on which to place the plants.

It is very interesting to sow various kinds of seeds in the indoor garden, such as canary-seed, cress, or linseed. For this purpose clay shapes can be purchased at a florist's shop. These are sometimes made in the form of a man's head, or a pig, and are very quaint-looking. The idea is to sow the seeds on the roughened part, and in this way, when the little plants are grown, to give the object the appearance of having long, upright green hair. The shapes are hollow, and must be filled with water.

The best way to sow the seed, which is bought in small packets, is to place a little in a teaspoon, and then to shake it over the rough surface. As the water will soak through the clay, the shape must, of course, be filled up afresh every day. Another way of growing small seeds is to borrow a sponge—a good big one if possible—and, after soaking it in water, sprinkle the seeds fairly thickly over the surface. If we want the seeds to grow quickly, we keep the sponge in the dark until the little plants appear. We then put the whole thing in a light place and keep it watered every day, or let it stand on a tumbler of water, and soon the sponge will be covered with bright green plants. If the sponge is not allowed to get dry, the seedlings will last for quite a long while. We may use a piece of thick flannel instead of a sponge, and it will do nearly as well as the other.

Cress-seeds growing on a clay head.

Some of the most curious plants for our indoor garden are those which are known as Resurrection Plants. They are called by this name because, when they are in a dry state, they look just as if they are dead, but if they are placed in water they become green and alive. Everybody who has a garden without soil should try to get one or two of these plants, for they can be easily purchased.

When you receive your first Resurrection Plant you will think that the dealer must have sent you a dead plant in mistake, so dry and withered will it look. Do not make up your mind, however, until you have followed the directions which are given here. Get a bowl, large enough in size to take the plant, and fill this with warm water. Now take your plant and put it into the water, pressing it down, so that it will become well soaked. Next put the bowl in a warm place, and leave it for a few hours.

When you come back you will find that the dead-looking Resurrection Plant has expanded into a beautiful green one, which is wonderfully fresh and alive. The plant is now quite ready for taking to the indoor garden, where it may be put in a saucer of water. It will keep green as long as water

is supplied, but it is not wise to allow the plant to grow for too long a period at a time. After a week or so the Resurrection Plant must be dried off, and allowed a month's rest, when it may be soaked into life again.

A bed of cress growing on a wet sponge.

Many kinds of plants will root and grow for a long time in plain water alone. One of these is the spiderwort, a variegated plant often seen in cottage windows, which will live and send out a lot of roots in a glass bottle. Sprigs of ivy can be made to do very much the same, and there was a lady who decorated her fireplace in the summer in this way. The shoots of ivy were placed in jars of water, and sent out many roots.

In January, if small branches of some of our flowering trees, such as almond or wild cherry, are gathered and kept in vases of water in a warm place, they will come into full blossom long before their natural time.

The Resurrection Plant, that seems to be dead and withered, but comes to life again in warm water.

In all these cases it is necessary to keep the water in the jars quite fresh, and this will be more easy if a piece of charcoal is put into each.

An interesting curiosity, which will do well for our garden without soil, is the arum from India, called the Monarch of the East. Bulbs of this strange plant can easily be obtained from the seedsman at a small price. It is quite one of the most remarkable plants in the world, for it will produce its great flower not only without any soil at all, but without water either.

The only thing we need do is to place the bulb, when we get it, in a light position, and simply leave it. If the room is nice and warm, it will not be long before the bulb will send up a long shoot, which quickly grows into a most magnificent flower, sometimes two feet long. This is all colored in crimson and yellow, and bears a long red spike. The best time to buy the bulb is about January.

If we want the bulb of this arum to live after it has flowered, we must plant it in earth, in a pot or out in the garden. After a while, in place of the great flower, will be sent up a giant leaf, which is really very handsome. At the end of the summer the bulb may be taken

Spiderwort growing in water without any soil.

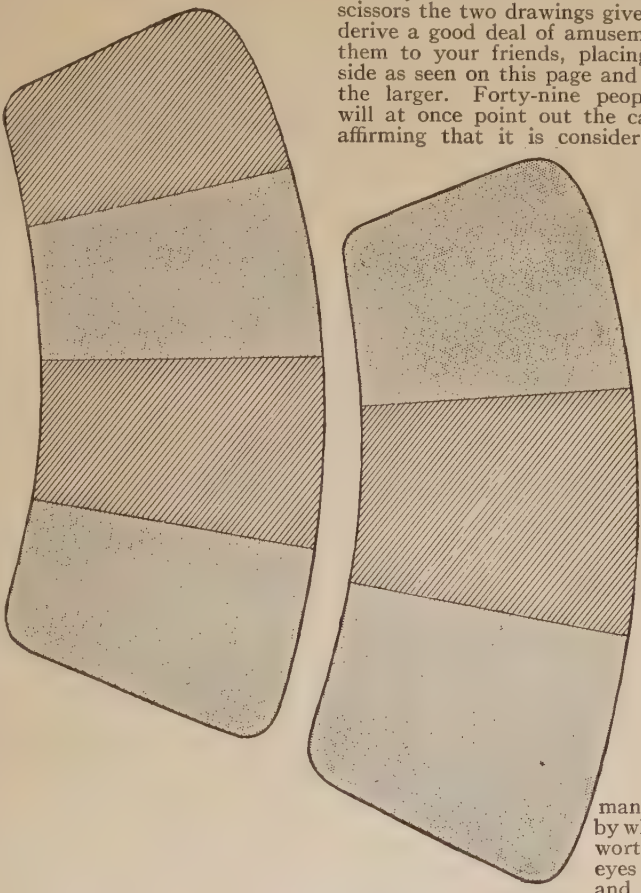
up and allowed to become dry, and then it can be put into its place once again, ready for flowering once more.

There are many other things which we might put in our garden in the house. Most children know that an acorn will grow into a fine little oak-tree if it is placed in a narrow-necked bottle which is kept well filled with water. In the same way, snowdrops and the dainty little blue scillas may be grown, and give us some gay flowers for the indoor garden. When we are out in the woods, we may gather portions of the bright green mosses, and these will live for many weeks if put into saucers containing a little water.

By getting together a collection of these different plants that do not require soil, quite an interesting indoor garden may be made, and this may become really pretty if the plants that form it are daintily arranged.

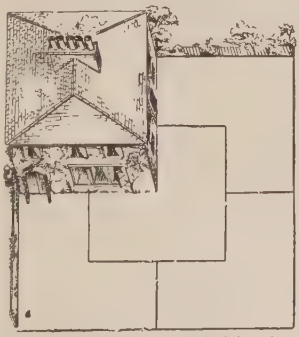
PUZZLING CARDS: WHICH IS THE LARGER?

AN old proverb says that things are not always what they seem, and this is something everybody finds out for himself sooner or later. Especially in regard to the size of things our eyes are prone to deceive us, and are particularly untrustworthy when we ask them to give us details. Ask any friend to point to a spot on the wall of the room or upon the door that would indicate the height that a silk hat would be if it were placed upon the floor. It is almost certain that your friend will touch a spot very much higher than the real spot. Probably he will indicate a point about twice as high as the hat will actually reach when it is placed on the floor. There are many other ways by which we can prove how deceptive are our eyes. Here we have an interesting proof of the tricks that our eyes play us. If you trace on card and then cut out with scissors the two drawings given here, you can derive a good deal of amusement by showing them to your friends, placing them side by side as seen on this page and asking which is the larger. Forty-nine people out of fifty will at once point out the card on the left, affirming that it is considerably the larger of the two. You may then ask your mistaken friend to say if he can tell by how much it is larger than the smaller one, and he will probably say that it is about one-fourth or one-fifth larger than the other. As a matter of fact both pieces are quite the same size. There are two things that assist each other in deceiving our eyes; one is the shape and position of the two pieces side by side, and the other thing is the markings on the two. There are many other devices by which the untrustworthiness of our eyes may be proved, and we saw some of them on page 112, but none of them is more striking than the one given here.



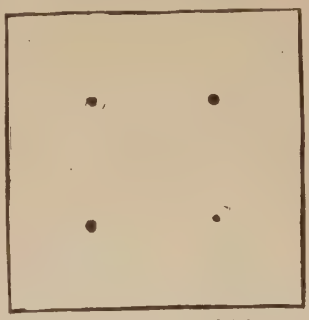
HOW THE FATHER DIVIDED HIS GARDEN

ON page 2522 is the problem of the garden which had to be divided into four parts, each equal in size and shape to the others. The birdseye view of the garden here given shows us exactly how it appeared after being so divided. In order to solve the problem we must set to work like this: First, we must make a tracing of the house and garden. Now, we know that the house stands upon one quarter of the whole ground, so if we continue the sides of the house we shall divide the garden into three equal squares. Next we divide each of these squares into four equal squares and we have the garden divided up into twelve small squares, all equal. By taking three squares for each child, the father was able to give Harry and Leslie and Doris and Gertrude each a plot of ground of the shape shown in our picture here. We can see at a glance that each piece is equal in size and shape to the others, but if we divide the garden in the way described here, we not only get the correct solution, but are able to see how and why the plots of ground are equal. The boys and girls were very much interested in their father's division of the garden, and they agreed that although at first they had thought it difficult and almost impossible to divide the ground into parts of equal shape as well as size, the solution was really simple.



THE MYSTERIOUS PAPER PURSE

THE young conjurer borrows a dime. Taking a piece of paper about four inches square, he lays this on the table, puts the coin in the centre, and folds down the sides over it. There is "no deception" so far; the coin is honestly wrapped in the paper. Picking up the little packet, he asks someone to blow upon it, or does so himself. When he again opens the paper the dime has disappeared, and the owner probably begins to wish he had not lent it. But again the young wizard folds the paper. Once more he blows upon it, and once more unfolds it. The dime has come back, and the owner of the coin looks quite cheerful again.



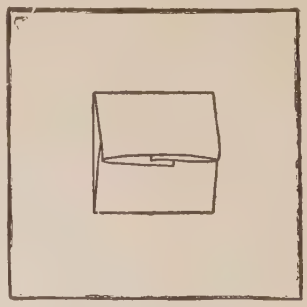
1. Paper marked for folding.

We hear it said of a boy sometimes, that he "is not such a fool as he looks," and the same sort of remark might fairly be made about our simple-looking bit of paper. It is not quite so simple as it appears to be; in fact, it is a "trick" paper, specially arranged for the purpose of this feat. The young conjurer may find some amusement in preparing such a paper for himself. To do so, he should proceed as follows:

Take a half-sheet of ordinary note-paper and fold it in two. Then, with a sharp needle, make four little holes through both thicknesses of the paper, two inches apart, so as to form a square, as shown in our first picture. Then cut apart the two portions of the paper, and fold down the edges of one of them towards the centre, using the needle-marks as guides. The paper thus folded will form a sort of little pocket, or envelope, as in picture 2. Paste or glue this in the centre of the other paper, exactly between the needle-marks. The two together will now look on the one side like our third picture, but on the other side like a plain piece of paper.

2. The folded paper purse.

This last is the side which, in performing the trick, you show to the company, taking care, by the way, not to show it with a light behind it, which would give away the secret. You then lay the paper, with this side uppermost, on the table. Having placed the coin on the paper, you fold down the edges over it, again using the needle-marks as guides, so as to make the folding correspond exactly with that of the pocket on the other side. The paper will now in reality form two such little pockets, back to back, but if you have done your work neatly, no one will notice that such is the case. In the act of offering the paper to be blown upon, you turn it over so that when you again open it, it is the empty side that you open. When it is blown upon for the second time, you again turn it over so as to bring the side in which you placed the sixpence uppermost.



3. The back of the paper as prepared for use.

You must, of course, not let the company perceive that you reverse the paper. To do this in proper conjuring style, you should hold it in the first instance clipped between the first and second fingers of the right hand. As you offer it to be blown upon, you must push it upwards with the thumb and clip its outer edge between the tumb and fore-finger, when it will have performed an imperceptible somersault. The turn over should be made with the arm in motion, when the greater movement will conceal the less important from the spectators.

The dime is brought back again by a repetition of the process. Of course, you are not bound to use a dime. Any piece of money, or a bone counter, may be substituted, according to the effect you desire to produce. Further, you may use the paper not only to "vanish," but to change one thing into another. For instance, in order to change a dime into a nickel, you have only to place a nickel beforehand in the pocket on the reverse side of the paper.

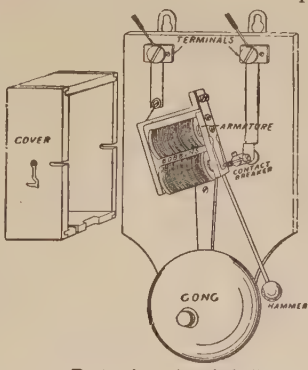
You may use the same paper more than once if you please, but it will in such case show by the creases that it has been previously folded, and the effect is scarcely so good as with a freshly prepared piece of paper.

The method above described is the simplest form of the trick. You may improve it considerably by using three pieces of paper instead of one. One of these must be rather smaller, and the other larger, than the trick paper. The smallest one we will call No. 1, the trick paper No. 2, and the largest paper No. 3. The first and last are mere plain pieces of paper, but you must have an exact duplicate of No. 1, and place this beforehand, properly folded, in the pocket of No. 2. When you work the trick in this manner you should, in a careless sort of way, show both sides of No. 1 before wrapping the coin in it. This done, you place this paper, with the coin in it, in No. 2, and then this latter in No. 3, first, however, turning it over as described. The trick is now done. When you come to No. 2, it is the empty duplicate of No. 1 that you find therein. This you should hand to someone else to open. Nos. 1 and 3 being obviously mere ordinary bits of paper, no one will suspect that No. 2 is a fraud.

FITTING AN ELECTRIC BELL

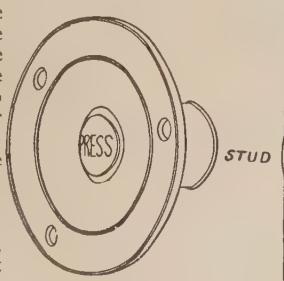
TO most boys the working of an electric bell appears to be a mystery, because the connecting wires do not move, as they do with an ordinary pull bell. But it is really very simple, as we shall see in this article. You must first of all have a battery, preferably a Leclanché, like the one described on page 1099, to make the electric current. Now, this current rings the bell by means of magnets which are formed from iron rods, wound round with wire. You can make a simple electro-magnet, as it is called, like that in picture 1. Get a little piece of iron rod—not steel—and coil some cotton-covered bell wire around it, leaving sufficient at each end to attach to the terminals of the battery. Secure one end to a terminal on the battery, and hold the other in your hand; then let this loose end touch the other terminal, and you will find that the iron rod is turned into a magnet, able to attract and pick up other bits of iron and steel. But directly you pull the loose end of wire away and so break the current, the rod loses almost all its magnetic power. If you were to use a hard steel rod, this would retain a good deal of the magnetism imparted to it by the current flowing around the coils of the wire, and become a permanent magnet. This kind of magnet, however, is not suitable for use in making a bell.

1. An electro-magnet.



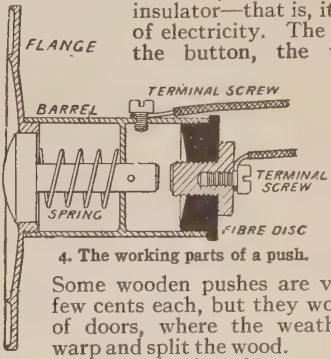
2. Parts of an electric bell.

Looking now at the bell, as illustrated in picture 2, you see the gong, by which the sound is produced, when struck by the little hammer on the end of the bent wire. The current comes from the battery to the two terminals attached to the baseboard of the bell, and passes down the brass strips connecting the terminals to the wire on the bobbins at one side and to the little pillar or "contact-breaker" on the other. This pillar has a screw, tipped with platinum, which does not get oxidized or dirty, exactly opposite another spot of platinum on the tail of the flat spring which we have already seen carries the armature. The wire from the bobbins, on the left-hand side, goes up to the end of this spring, so that, if the two platinum surfaces meet, a complete circuit takes place. Now a peculiar thing happens, due to the adjustment of the flat spring, which is set so that the platinum bits just meet. The moment the current is turned on, the two bars inside the bobbins, together with the frame to which they are fastened, become magnetized; and the armature jumps like lightning towards the magnets, making the hammer strike the gong. But the flat spring has now moved away from the platinum-tipped screw on the contact-breaker, so that the contact is broken, the current does not flow, and the bobbins fail to magnetize the bars within them. What happens, of course, is that the armature falls away under the persuasion of its flat spring. But still it has no peace, for the platinum surfaces meet again, and the same action occurs. These to-and-fro movements are very rapid, so that you can understand why the bell is called a "trembling" bell. These bells can be bought from twenty-five cents upwards. Some of the smaller ones are made entirely of metal, instead of having a wooden baseboard and cover, and more elaborate ones may be had nickel-plated.



3. The push.

It is necessary to have some means of easily making and breaking the current between the battery and the bell, so that one can make the latter ring when desired. This is done by a "push," which in the case of a house bell is fixed by the side of the front door for visitors. The push seen in picture 3 has a brass or china button in the centre, and the inside is made as shown in picture 4. The wires are brought, as seen, to two screws, one let into the side of the barrel and the other into the middle of the brass piece in the fibre disc. So long as the press stud is not touched no current can flow, because the fibre acts as an insulator—that is, it is not a conductor of electricity. The moment you press the button, the tail moves along and the two platinum faces meet, and the current passes.

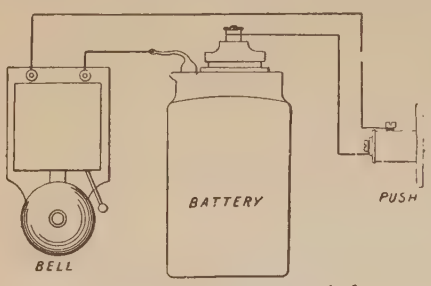


4. The working parts of a push.

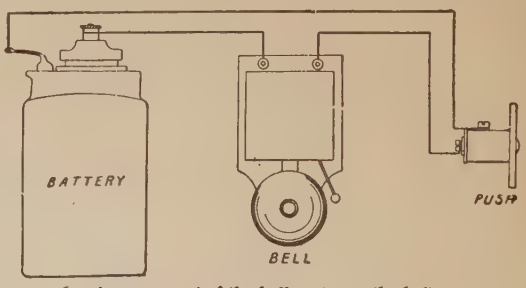
This kind of push is made all in metal, and is constructed so that the rain cannot get in. Some wooden pushes are very cheap, only a few cents each, but they would not do for out of doors, where the weather would quickly warp and split the wood.

The only other thing required in connection with the outfit is a supply of wire, to connect the battery, bell, and push. Copper wire is used, and it is insulated, being covered with plaited cotton over a thin layer of rubber. The wire is tinned to prevent oxidation, and the cotton covering is soaked in wax to render it proof against damp. We have observed in the pictures of the bell that there are two

terminals each on the battery, the bell and the push, and these must be coupled up with wire in such a manner that a continuous circuit, or course, is formed for the current to pass when the push is pressed. It does not matter which is near the push—the bell or the battery. Pictures 5 and 6 show two arrangements, with black lines representing the wires connected with the terminals. When the push is pressed the circuit is completed, and the current from the battery passes throughout this way, ready for installation. Having the bell, battery, and push, we must find the length of wire required, the best way being to take a ball of string and measure the distance with it. Start from the door where the push is to go, and run up inside the corner of the wall and along the angles of the ceiling, and round any corners to the place where the bell has to go, and then on to the battery. Allow two or three feet over for connecting up and possible errors you may make in measuring, and either



5. Arrangement of the bell system: the battery between the bell and the push.



6. Arrangement of the bell system: the bell between the battery and the push.

the system, causing the bell to ring so long as the push-button is held down.

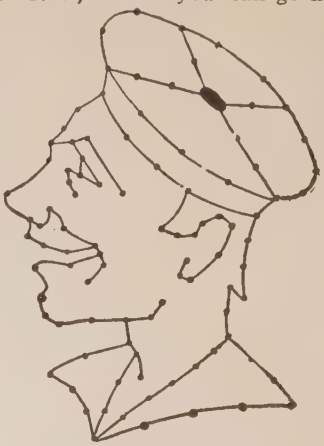
In these drawings the parts are shown close together for convenience, but it must be understood that it makes no difference to the working if they are separated by a considerable distance, because the current goes through the wires readily. The battery, therefore, need not be placed close to the bell. Thus the latter is usually placed in a hall or back room, and the battery in any cupboard or on a shelf that happens to be handy. It must not be placed too high up, because the heat of the upper part of the room will dry up the solution too quickly. In some cases the bell and battery are mounted together on a little bracket. They can be purchased in

7. Wire staple.

measure the length of the string in yards, or take it to the electrical shop and ask for wire of *double* that length. This is because it has to go the distance and back again. Or we can buy "twin" wiring, which is composed of two copper wires, insulated from each other, and again wound round with cotton covering, forming only a single piece, which is more handy to fit up than the two separate strands. If we buy twin wire, it need be only the length of your string. Tinned staples, as shown in picture 7, are used to fix the wire to the walls and corners. Take care not to drive these staples in too tightly, or they will cut through the insulating material, and make a "short circuit" between the wires.

THE PUZZLE OF THE LAUGHING SAILOR

HERE is the portrait of a laughing sailor made up of lines and dots. Now, what is he laughing at? Well, he knows that there is a puzzle to be solved in connection with his face, and he is laughing because he thinks none of us will be able to solve it. If we look closely at the portrait, we shall see that in several parts the string of lines and dots comes to an end in a single dot, as, for example, in the eyebrow and the ear. There are, altogether, six of these places where the lines come to an end. Now, this is the puzzle of the laughing sailor's face. If we start at the big spot in the middle of the man's cap, counting that as number one, it is possible to move along the lines, counting the dots as we go, till we come to a twenty-fifth dot, and that dot to be the dot at the end of one of the lines like the eyebrow, where you can go no farther. There are several ways in which this can be done, and we can take them one after another, and, starting at the button in the centre of the cap, reach the dots where the lines end, counting only twenty-five dots in all each time, including the one where we finish and the big dot in the middle of the sailor's cap. Now let us see if we can do this, and in how many different ways it can be done. We do not want to spoil this book, so we will take a piece of tissue or tracing paper, and, putting it over the sailor's face, trace it. Then we can mark the traced copy. Be sure to remember that we count the big button of the cap where we start as the first dot, and we must always end at the twenty-fifth.



A USEFUL SHOE-BAG OF SERGE

WHEN we go out to tea at a friend's house, or to a dancing class, we find a bag of some kind useful for carrying slippers. It looks better than a brown paper parcel, and the shoes are popped into it in a moment.

If we make our own bag, we can shape it as we please, and cut it large or small according to the size of the shoes to go into it. One made in the style of the Dorothy bag with a running cord looks well; it costs little, for it can be made for less than a quarter, and is light and convenient to carry on the arm. If made of rather thick material the bag will keep out the rain.

The materials required are these: a piece of some fairly thick material measuring about thirty inches by thirteen inches, such as the green art serge, fifty inches wide; the same quantity of sateen for the lining—a suitable kind thirty-one inches wide is sold; one yard of twisted silk crape cord. Silk crape cord is the name for it, though there is no resemblance to crape.

If we choose the green art serge for the material, the sateen lining might be of a golden brown color, and the cord to match.

We must remember that slippers are going into the bag, therefore a light, dainty color, such as cream, would be less serviceable for a lining than a darker one.

Having cut out the serge and the sateen, we fold the serge over in halves lengthways, wrong side outermost, join the sides together from the fold to about three-quarters or more up the sides by a stitched seam of rather small stitches, far enough from the edge to prevent fraying, using, if possible, green cotton to match. Then we fold the sateen for the lining in the same way, but, instead of making stitched seams up the sides, we turn in the rough edges of the sateen, and, placing one over the other, sew them over and over with close, neat stitches, taking care not to pucker the sateen, and, if it is at hand, using thread to match. The passing of a hot iron over these seams will make them lie flat.

Now we have roughly made two bags, one of the serge, the other of the sateen. Let us turn the sateen bag inside out and then push the serge bag into it, taking care to fit it into the corners nicely, till the lining lies smoothly against the serge. It will be necessary to stitch the lining to the material at the bottom corners to prevent its being dragged out when the shoes are withdrawn from the bag; but we should not let the stitches show through the material.

The bag now has the lining outside and the material inside. The next thing to be done is to finish the top of the bag. First we turn in the rough edges of the serge and the sateen from the point where we stopped joining up the sides of the bags, and hem the sateen down on to the serge a little way from the edge of the flaps, so that the lining does not show when the bag is seen held upright.

Now the bag is ready for the running cord. There are two ways of running this into the neck of the bag. We may buy half a dozen bone rings for five cents a dozen and sew them at intervals along a line two or three inches from the edge of the flaps; then pass the cord through these and sew the two ends of it together. Another way is to make two running seams with green thread two or three inches from the edge of the flaps through the serge and the sateen, wide enough apart to leave room for the cord between them. The bag at this stage—lining outermost and ready for the running cord—is shown in picture 1.

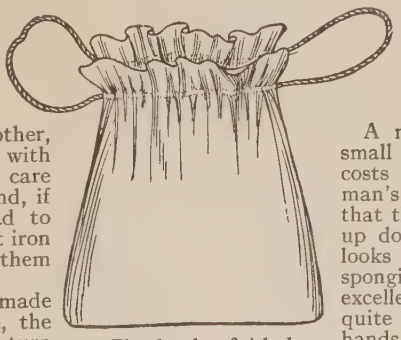
1. The bag ready for the running cord.

If we have no bodkin with an eye large enough for the cord, we can tie a thread to the end of the cord, and use a bodkin to draw this through the neck, dragging the cord after it.

We now turn the bag right side out and it is finished, as shown in picture 2.

We have made, of course, quite a plain shoe-bag in which the shoes can be carried placed toe to heel and upright, so that they do not poke and get in the way when carried in the bag, as they might do placed flat along the bottom of it.

Many girls like to embroider the owner's initials on the bag. This can be done with *lustrine* or crewels in satin stitch as described on page 1518. Or we may form the letters with the cord by stitching it down to the material. In either case the monogram is worked on the serge before it is made into the bag.



2. The shoe-bag finished.

A novel material for a very small shoe-bag, and one that costs nothing, is the silk of a man's old silk hat. The fact that the surface has been rubbed up does not matter, for it now looks like fine plush, and after sponging and heating makes up excellently, wears well, and is quite light for a little girl's hands. A scarlet sateen lining or red twill would do well for this little bag, and the effect is charming.

These little Dorothy bags are useful for all kinds of things. If they are made of soft satin, of some dainty shade, they may be used for a work-bag. Many people make them of a much smaller size, fit them up with needles, cottons, scissors, and thimble, and use them instead of a little work-basket. Such a bag is more handy than a basket, as it can be tucked away in a corner of a trunk.

CAN YOU TELL THE REASON WHY?

THE GAME OF "WHY IS IT?"

HERE is a game which may be played in a very similar way to those described on pages 2362 and 2523. A boy or girl should read out the descriptions, and the game is to explain the causes. A large number of the answers should be quite well known to readers of this book. They are, however, given on page 2720.

SHOULD THE RAILWAY LINES JOIN?

1. There is a little path across a meadow near our home. It leads down to a railway cutting, and, sitting on the stile at the end of the path, we can look down on to the railway lines. Yesterday some of us were waiting there to see the express pass, and we noticed that where two rails joined end to end they did not quite meet. There was a space of about a quarter of an inch between the ends. Could it be a mistake of the workmen who laid the rails? When the express had passed we looked out for the joinings of other rails. There was always a little space left; so it seemed to be done on purpose. Why?

THE PUZZLE OF THE LOOKING-GLASS

2. One day a little girl was sitting in the corner of a room on the same side as the door, so that when anyone opened it she could not see the person's face; but she found that all she need do to find out who the friend was, coming through the doorway, was to look in a mirror over the fireplace on the opposite wall. There she could see quite clearly the face and head of her friend, but she could not see herself in the mirror at all. When she got up from her seat and walked to meet her friend, she looked in the mirror, and so did her friend. They found they could see each other in the mirror as they advanced, but their own faces were not seen until they were opposite the mirror. They are puzzled about this. Can you help them with the reason?

THE SHELL THAT SEEMS SO NEAR

3. In the summer holidays, when we were bathing one sunny day, and there was hardly a ripple on the water, we could see the sand clearly at the bottom. Now, a funny thing happened. As we came down the steps of the boat-house to get into the water, the lower steps under water seemed quite near, and we thought the water must be very shallow; and yet we went down and down until the water reached up to our waists. There was a shell lying in the sand a little way out, which looked easy to pick up, but was really too deep down for our arms to reach without dipping our faces down under water. We tried with the other arm, but it was no good. What was the matter? Had our eyes all made mistakes and deceived us?

THE COLORS ON THE CEILING

4. A little boy had been ill with measles, and went to stay with his grandmother. He had to lie still on a sofa at first, until he grew strong. One day he was looking at the ceiling and saw some beautiful colors there in a row —red, orange, yellow, green, blue, indigo, violet. How did they come there? They were lovely pure colors, far nicer than those in his paint-box, and reminded him of those in a rainbow. But he saw no rainbow out of the window. He rubbed his eyes. No, the colors were still there. Then he said their names over to himself until his grandmother came. She told him about a little boy who found out about those wonderful colors. What do you think she said had made them?

THE VOICE THAT CAME FROM A ROCK

5. High up on the Alps in Switzerland people want to send messages across to the mountain on the other side of the valley, or at the bottom of it. But it takes long to walk, so they have found a way of calling to each other. See! there is a mother standing at her cottage door, wanting to call to her son, who, she knows, is far below her down the mountain. With both hands to her mouth she sends forth the cry "Come home!" not straight down to him, but towards a rock below on the opposite side of the valley. Then she waits. After a few seconds she hears the answer "Coming," not from below her, but from the opposite rock. Why did she not call straight down to her son?

THE SCENT THAT CLIMBED OUT OF A BOTTLE

6. Someone gave a little girl a large bottle of eau-de-Cologne for a Christmas present. That scent is sometimes refreshing to anyone with a bad headache. The other day the little girl's mother had a headache, so she brought the scent for her, and dabbed some with a handkerchief on her mother's forehead. She left the corner of the handkerchief in the wide neck of the bottle on a side table and forgot all about the bottle. Next morning she went to seek it, but found that much of the eau-de-Cologne had disappeared. The handkerchief was wet, as though it had been soaked with scent. It was puzzling to know how the scent got out of the bottle. Do you know why it could not help getting out?

ANSWERS TO THE GAME OF "WHAT IS IT?" ON PAGE 2523

THESE are the answers to the History Puzzles that are to be found on page 2523:

1. King John signing Magna Charta.
2. Landing of the Pilgrim Fathers with their wives and children from the Mayflower.
3. Queen Margaret, the wife of Edward IV., and her little son, saved by a robber.
4. Luther nailing his propositions to Wittenberg church door, and burning the Pope's bull of excommunication which was sent to him.
5. Sir Francis Drake warned of the approach of the Spanish Armada while at bowls.
6. The Emperor Napoleon imprisoned in the little island of Elba in the Mediterranean.

GAMES TO BE PLAYED IN THE NURSERY

BIG boys and girls will not want to come with us now, for we are going to the nursery to have fine fun and frolic with the very little people.

HUNT THE SLIPPER

ALL the players but one—"cobblers," as they are called—sit on the floor in a circle a few inches apart. Then the customer comes and says: "Please, I want this old slipper mended. I will call for it in ten minutes."

She hands one of the cobblers an old slipper, and turns away. When she has counted up to ten, she comes back, but is told the slipper is not ready.

"I must have it," says the customer.

"Then you must find it," all the cobblers reply.

At that the search begins. Each cobbler passes the slipper on to his or her neighbor, hiding it from sight as much as possible; but should the seeker spy it and call out the name of the cobbler who has got it, that cobbler must take her place, and bring it to be mended again. The slipper must not stop in one place, but must keep passing round in the circle, either one way or the other.

THE GARDEN GATE

THE garden fence is made by all the players, except one, holding each other's hands, standing in a big ring. In the middle stands the single player, while the rest dance round her three times. Then they stand still while she sings:

"Open wide the garden gate, the garden gate, the garden gate,
Open wide the garden gate and let me through."

But the "fence," as the ring is called, only answers, as it dances round again:

"Get the key of the garden gate, the garden gate, the garden gate,
Get the key of the garden gate and let yourself through."

Then the poor prisoner cries:

"I've lost the key of the garden gate, so what am I to do?"

Still dancing, the others sing:

"Then you may stop, may stop all night within the gate,
Until you're strong enough, you know, to break a way through."

At this the prisoner runs between two of the boys and girls—the "palings" of the fence—and if, by pushing, she can make them unclasp hands, one of them takes her place in the middle, and the game begins again.

HUNT THE RING

THIS game is played by all the boys and girls standing up in a circle, with the seeker inside. The ring is slipped on a long piece of thin cord or twine, the ends of which are then tied together. Each one in the circle holds this cord with one hand and passes the ring along it with the other. The game is to pass the ring along while the seeker is looking another way. The ring may be hidden by holding the hand over it till there is a chance to pass it on. The ring must not stay in one place, and when it has been found the one who held it must take the place of the seeker.

HOLD FAST! LET GO!

YOU must listen to what is said in this game, and be careful to do exactly the opposite. Four players stand up, and each takes hold of one corner of a square sheet of paper or a handkerchief. A fifth player calls out: "Hold fast!" and anyone who does not let go will be out; while, if the order is "Let go!" those who *fail to hold fast* will be out. The orders must be given rapidly, one after the other, and someone is sure to make a mistake, but the last to do so, of course, is the winner.

PUSS IN THE CORNER

IN this game all the children pretend to be mice, except one, who is the puss. "Puss" stands in the middle of the room. Each mouse stands in a corner. While there Puss cannot touch them, but when they run across the room to change corners with one another she may capture any she can. No mouse should venture from a corner until she has made signs to another mouse with whom she would like to change houses, or she may find herself half-way across the room with no corner to run to. The mouse that is caught must take the place of Puss.

DUCK UNDER THE WATER

THERE should be a good many players for this game. Choose partners, and form two lines a little apart, each couple standing one behind another. The front or leading couple then form an arch by joining hands, and the last two of the line skip together down the alley of players, pass under the arch, and, stopping immediately on the other side, make a second arch. Then the next couple from the end do the same, and the next, and so on until a long tunnel is formed of lifted hands. The tunnel may be taken down by the first partners who began it lowering their arch and passing through. The next two follow, until the last arch falls, and the builders are ready for another game.

BLINDMAN'S BUFF

THOSE who want to make a great noise will have a chance now. One player is taken into the middle of the room. where a handkerchief is tied over his eyes. He is then turned round three times and told to catch whom he can. The other players run to and fro, passing as near to him as they dare, while the blindman rushes in all directions, clutching at those who seem nearest. When he succeeds in catching someone, he must guess who it is, and, if correct, the person

caught must be blindfolded in his place. If he cannot guess, he must leave go and try again.

WOLF

THE "wolf" is a player who creeps away to one side of the nursery, and hides behind chairs and tables or boxes. The "sheep" all huddle up at one end of the room, and the shepherd stands at the other. Presently he calls out to the sheep to "come home, for the night is falling."

"We are afraid of the wolf," answer the sheep.

"The wolf is away!" cries the shepherd.

Then the sheep all run across. Out jumps the wolf and catches whom he can. The game lasts till there are no sheep left to be caught.

BINGO

THE music for the song is given on page 2748.

The players join hands in a ring, with one of their number, who is called the "miller," in the centre. Then all, still holding hands, dance around and sing:

"The miller's dog leap'd over the stile,
His name was little Bingo:
B with an I, I with an N, N with a G, G with an O,
And his name was little Bingo."

Then as they stand still again the miller cries out "B" and points at one of the players in the ring, who must say "I," the next to her "N," and so on, until the little dog's name is spelt. The first player to say the wrong letter has to change places with the miller.

FEATHER AND FANS

A FLUFFY feather out of any cushion will do for this game, and if there are not enough fans to go round, stiff pieces of paper or thin card will do quite as well. Draw a line across the nursery floor, and let half the number of players be on one side and half the number on the other. When all are ready, toss the feather into the air and keep it up with the fans. No players must leave their side of the line, but should do their best to stop the feather sailing across it. Those in whose country it falls at last lose the game. Of course, the feather, while in flight, must not be touched.

A GOOSE MARCH

ALL the players but one (who is the officer) form in a line, one behind the other, but a little way apart. When ready, the officer cries: "March!" Away go the soldiers at a rapid step, till suddenly the officer calls out: "Halt!" Anyone who bumps against his companion in front, or has both feet on the ground, is sent to the back of the line with a bad mark. The order to "March!" or "Halt!" is given as many times as there are "soldiers," and in the end the bad marks are counted, the one with the smallest number being the winner.

BRIDGE-BOARD

A BRIDGE-BOARD is a long, thick piece of wood with a number of arches cut in it. If we have not one, we can build a very good board from a box of bricks, or even by standing our smaller books in a row, and placing others across the tops. Each arch or opening of the bridge should be marked with a separate number, and one of the players, called the "keeper," should stand by it at one end of the room, while the rest go to the other end with marbles. Turns are then taken to roll the marbles through the bridge, the one who sends them under the arches with the highest number winning the game. When we build our bridge we can make the arches whatever size we like. They should be large if we choose to roll the marbles from a distance, and small if we are going to stand near.

A HOUSE PAPER-CHASE

FOR this game we shall want a large number of pieces of square paper about the size of a playing-card. On each slip a figure should be marked plainly—thus, 1, 2, 3, and so on, up to 20 or 30. These slips are given to the boy who is the "hare," with permission to drop them one by one, in the order of the figures, anywhere he likes in the house, but always where it will not be very difficult to see them. After waiting a minute or two, the hounds start in pursuit, but must follow him only by finding the scraps of paper in their proper order. The hare does all he can to avoid being seen until he is safe back home at the starting-point, but even if seen he cannot be caught unless the hounds can produce all the slips of paper that he has scattered. If they make a prisoner of him, and he can show that there are numbers missing between those he still has and those in the hands of his captors, he must be set free again. If there are only one or two thus missing the chase becomes exciting, because he must not return home till all his slips are parted with.

TIT TAT TOE

DRAW a large circle on a slate with a very small one in its centre, then from one to the other draw lines like the spokes of a wheel, and put a number in every space between the spokes from 1 upwards. The more spokes and spaces the better. In the small inner circle 100 is written. The first player then begins by holding a slate pencil upright with its point in the space marked 1. Closing her eyes, she shifts the pencil round the wheel step by step, repeating these words:

"Tit, tat, toe, my first go,
Three jolly butcher boys all in a row.
Stick one up, stick one down
Stick one in the old man's crown."

With the last word she opens her eyes, and writes down the number of the space in which the pencil is resting. The next player then takes the pencil and begins "tit, tat, toeing," and when all have had a turn the scores are counted up, the one who has the highest number winning. Any player who puts the pencil into the inner circle scores 100, and wins at once, while those who let it rest on a line or spoke must pass it on to the next without counting anything.

SCHOOLMISTRESS

THE mistress stands in front of the class and, beginning with the scholar at the top of the form, she asks questions as quickly as she can think of them. She begins with the letter A, and forms her questions so that the answers begin with this letter. For example: "The name of an English queen beginning with A." If the answer is not given before she can count up to ten, she goes to the next scholar, and the next, until one is reached who replies. This scholar goes to the top of the class, and another question is asked on the letter B, and so on through the alphabet. It is *quickness* more than anything else that makes the fun in this game.

THROWING LIGHT

TWO players secretly choose between them a word that has two meanings, such as "Ball"—a thing to play with, and "Ball"—a dance. They then begin talking to one another aloud, referring to the word without using it. One will say: "I played with it in the garden this morning." "Yes," says the other, "and a friend of mine went to one last night."

Those listeners who think they have guessed what the word is may join in the conversation, but must pay a forfeit if mistaken.

TELEGRAMS

ONE of the players calls out that a telegram of ten words has to be sent off describing, let us say, the Boat Race, and the words must begin with certain letters. He mentions ten letters of the alphabet which he has chosen, and each player puts them down on a slip of paper. Five minutes are given for the writing of the telegrams, and when the time is up they are all read out aloud. Clever players sometimes make very funny telegrams, and a great deal of fun can be got out of the game. A prize can be given for the best telegram.

THE GENTEEL LADY

THOSE who take part in this game will want very good memories. It is begun by the second player from the left-hand end saying to her neighbor on the right: "Good-morning, genteel lady, always genteel. I, a genteel lady, always genteel, come from that genteel lady, always genteel (pointing to the girl on her left), to tell you that she owns an eagle with a golden beak."

The neighbor receives this information with a bow and repeats it to the girl on *her* right, adding at the end of the words "and silver claws." This third player then bows and passes it on, adding to the sentence a remark about the eagle's feathers. Each player adds something of her own, and the first girl who fails to repeat, word for word, the message she receives has a paper spill, called a horn, stuck in her hair. The player sitting next then turns to her right-hand neighbor and takes up the tale in these words: "Good-morning, genteel lady, always genteel. I, a genteel lady, always genteel, come from this *one-horned* lady, always one-horned, to tell you," etc. Every mistake means a fresh horn, and the game often ends by all "genteel ladies" becoming "one-horned," or "two-horned," or even "four-horned," because with every repetition the words get more difficult to remember.

POST GENERAL

ALL the players sit round the room in a large circle, and one, who is blindfold, stands in the middle. Each player takes the name of a town, and the leading player makes a list of these, from which he calls out now and then, thus: "The Express is going from Boston to New York," choosing towns on opposite sides of the circle. Boston and New York jump up and slip across to each other's seat, the blindman doing his best to catch one of them as they pass. When several towns have changed places, and the blindman has failed to make a prisoner, the leader cries out "All change," when all must jump up and cross over to opposite sides. In the hurry and confusion the blindman is sure to catch someone, who takes his place while he becomes one of the towns.

WINKS

A CIRCLE is formed of chairs, one only of which is unoccupied. Behind each chair, including the vacant one, stands a player whose duty it is to prevent the person sitting in front from leaving his chair, though no effort must be made to check him until he shows some intention of escaping. The guardian of the vacant seat looks round the ring and winks to someone to come and occupy it. The player thus called must be very alert, or the one behind the chair will clutch him before he can get away. One touch is enough. If successful, the chair left becomes the vacant one, and the player behind it must lose no time in trying to get another tenant by a wink or a nod at someone else. The faster the changes take place the greater the fun, but the guardians behind the chairs must, of course, be as quick as they can to avoid losing their charges.

OBJECT GAME

THIS is good practice for the memory and the power of observation. Each member of the party has a piece of paper and a pencil. When all are ready, someone enters the room carrying a tray with about twenty small articles on it. The tray is placed in full view of everbody and left there for one minute, during which time no one must touch pencil or paper, but must simply look at the contents of the tray. At a given word it is carried away, and the players must write down the names of as many of the articles as they can remember having seen. Only a certain time is allowed for this, and those who remember the greatest number of articles win the game. The objects chosen should be of the simplest kind—a black pin, a tiny piece of coal, some birds' seed, a piece of fluff, a hair, and so on.

YOU MUSTN'T LAUGH!

ALL sit in a row round the fire and look solemn. Then the first player says: "Haw-haw!" which is repeated all down the line, one after another. Those who can not do this without laughing afterwards are declared out, and the game begins again.

CONTINUED ON 2719.

HAMBURG, THE HOME OF GERMAN COMMERCE, AND BERLIN, THE GERMAN CAPITAL

Hamburg, the greatest commercial centre and seaport in Germany, is shown in the upper picture. It is one of the principal commercial cities of the world, and was founded by the Emperor Charlemagne. It is built on the River Elbe, and from its mighty docks great liners go to all parts of the world. The lower picture shows Berlin, the great political centre of Germany, and the capital of Prussia and the empire. It is not an ancient city, but is becoming one of the most imposing cities in Europe, with its many fine public buildings, and monuments, and its splendid avenues and squares. The domed building on the left is the new cathedral, and the one on the right is the royal palace.

Representatives of the nations sitting at Vienna to restore order to Europe after Napoleon's fall.

THE MAKING OF GERMANY

CONTINUED FROM 2561

"WE must utterly break up Germany," were Napoleon's words and aim all through the years of bewildering ever-changing conditions in Central Europe, when peace never once came to stay. At the most there were occasional stoppages in the war, while he was trying to disunite the German-speaking peoples. These were strong, while bound together, like the bundle of sticks in the fable, but easily destroyed when they fell apart. Unhappily, there were many jealousies and divisions among the states from one cause and another, and after the battle of Austerlitz several of the states joined together in a union "protected" by the French, in league against Austria and Prussia. Austria lost her fairest provinces after Austerlitz; Prussia, half her territory after Jena. When the noble-hearted and beautiful Queen Louise of Prussia begged Napoleon to have some mercy on her unhappy country, the very apt answer sent to her was—a map of Silesia, that rich province won from Maria Theresa by Frederick the Great, encircled by a golden chain and a pendant heart.

What a terrible set-back it was for the young, rising nation to have its army wiped out, French soldiers occupying the country, Napoleon ruling from Berlin, whence he sent out his Berlin Decrees about the trade with England. None could gainsay this conqueror, who could race about all over Europe—before there were any trains!—without sleep or rest; who could fight five battles on five successive days, and overcome every difficulty, even the snowy Alps. When Napoleon was at the very height of his success, between 1807 and 1809, it could be said that all Europe was practically under the power of two emperors. They were "The man from Corsica" and the Emperor of Russia.

We have seen on page 2288 how the tide turned in the bitter Russian campaign. Central Europe was not slow in seizing the chance, and the whole German people rose against the yoke of Napoleon, eager to wipe away the dishonor of its defeats and subjection.

Prussia was particularly eager to drive out the French garrisons, and all of the people hastily gave money or labor, or volunteered to fight. Nothing was too great or too small to do which might help to recover what had been lost.

The famous general, Blücher—he

who later reinforced Wellington at Waterloo—earned in one of the first battles at this time the name of Marshal "Forwards," from the soldiers who followed the impetuous leader to his thunderous cry of "Vorwärts!" He but expressed the spirit of the time. At the "Battle of the Nations," fought near Leipzig through four long terrible days, Napoleon was beaten at last, and Germany freed from the French.

THE BREAK-UP OF NAPOLEON'S EMPIRE, & TEN YEARS OF DISORDER IN EUROPE

The empire of the "successor of Charlemagne," as Napoleon loved to call himself fell apart even more quickly than it had been formed. It was not an easy task to bring back order in Europe, especially when many of those concerned at the Congress of Vienna proved to be jealous and greedy. But it was accomplished in some fashion at last, in spite of the thrilling interruption of Napoleon's escape from Elba, and the brilliant Hundred Days in which his genius made a last effort before the final and crushing defeat at Waterloo.

Pitt was right in that sad remark he made about the map of Europe, after Austerlitz, just before he died. It lay unrolled again before the Congress of Vienna which met in 1814. Let us study it, too, and get clearly in our minds the names of the chief states of the German-speaking people, and where they lie in that great central heart of Europe, with its mountainous masses to the south, its great plain crossed by many rivers to the north, its grand waterways of the Rhine and the Danube flowing north and east from its south-western corner. It is their natural features which have remained the same, unchanged through the centuries, in every map that has been drawn to show the constant changes that have taken place in the sharing-out of the land by the movements of men.

MOUNTAIN PEOPLE WHO LIVED QUIETLY AMID GREAT CHANGES

We have seen how these changes arose, by conquest, by the marriage of heiresses, by the division of states among different members of a family.

Perhaps the most stable of the provinces has been Bohemia, so safely sheltered by its semicircle of beautiful mountains, the Giant and Ore Mountains, the home of endless stories of gnomes and dwarfs. The Bohemians belong to a different family of nations from the old Teutons, or Deutschen, called the "Slavs," but they have counted as dwellers in a German state for nearly a thousand years. Their history touches that of England on the field of Cressy, when their blind old king was killed. Bohemia was the country of John Huss, a reformer who followed the teaching of John Wyclif. On its borders we can find Austerlitz. Its capital, Prague, is on a branch of the Elbe, one of the great German rivers flowing northwards.

Another state that has existed with very little change in its territory through history is Hungary, and it is also not a German nation. The Hungarians to this day keep up their own language and customs. Their ancestors, the Magyars, settled about the Danube where it takes its sharp bend southwards, near the modern capital, Buda-Pesth. The old capital is Presburg, to which Maria Theresa, of whom we read on page 2561, fled for help when sore pressed by her enemies.

VIENNA, THE CAPITAL OF AUSTRIA, BAVARIA, AND SAXONY

Both Bohemia and Hungary long ago were joined with Austria, the state on the east border of the empire, which shifted its boundaries as the years went on, acquiring land or losing it, not only on its "home" edges, but, as we have seen, across land and sea, in the Netherlands, and in Italy. After the Congress of Vienna, its ruler, the Emperor of Austria, as he had styled himself some years before, when he laid down the title of Holy Roman Emperor, kept the beautiful eastern part of the Alps and lands on the Mediterranean waters, besides Bohemia and the sister state of Hungary. The great capital of this Austrian Empire was Vienna, on the Danube, which we have seen besieged by the Turks in the time of Louis XIV., and taken by Napoleon.

The kingdom of Bavaria was the neighbor of Bohemia and Austria, and its history has been much interwoven with theirs. So much has been taken from one end, and added at the other, that there is little of the original ancient duchy existing under the old name. Its fine capital, Munich, is on a tributary of the Danube, the "Iser rolling

THE SURRENDER OF AN EMPEROR

The Franco-German War was a series of brilliant triumphs for Germany and a succession of blunders on the part of France. The French Emperor, Napoleon III., and his army marched into a valley at Sedan, where, as a French writer, Victor Hugo, has said, they were "without order, without discipline, a mere crowd of men waiting to be seized by an immensely powerful hand." The Germans surrounded them and compelled them to surrender. Here we see the beaten French Emperor meeting Bismarck, Germany's "Iron Chancellor."

rapidly," so vividly described in Campbell's poem, "Hohenlinden," which is given on page 1059, where a great battle was fought by the French and Austrians in the early days of Napoleon's successes.

As for Saxony, north of Bavaria and Bohemia, so complete has been the shifting of its boundaries that the old land of the Saxons, from which the early conquerors of Britain came, has nothing in common with the Saxony of later times, except the name.

A part of the district where Saxons jostled Angles is now Hanover, lying about the root of the Danish peninsula, which separates the North and Baltic Seas. This district is particularly interesting on account of the free towns, such as Hamburg, Bremen, and Lübeck, which rose up in it, doing so much for trade and liberty in old days, and also because, for over a hundred years, the ruler, or "elector," of Hanover was also king of England. Dresden is the capital of Saxony, and is on the River Elbe.

THE BEGINNINGS OF THE GREAT KINGDOM OF PRUSSIA

To find the beginnings of Prussia, later a great kingdom stretching from the borders of Russia, along the Baltic Sea, and across to the Rhine, we must look for the old province of Brandenburg, between Bohemia and the Baltic. Gradually, during the last 200 years, East Prussia, West Prussia, and Silesia were joined to it. At the Congress of Vienna, Prussia gained half of Saxony, and large districts on the Rhine.

It is strange that the name of this leading German state is that of the conquered old land of the alien Prussians, just as the English, to-day call themselves and their land British and Britain. Berlin, the capital, stands on the River Spree, which connects with the Elbe, at the meeting of the ways in the great plain. It first owed its growth to the rulers who laid the foundations of the greatness of Prussia.

To the east of Bohemia and Brandenburg there lay in the past, about the time when Columbus was sailing the clear Caribbean Sea, the large and flourishing kingdom of Poland, a "Slav" country, like the others on the eastern borders of the empire. To-day the name of Poland is restored to the map. Its frontier was ever changing, and at times, when the country was exceptionally weak, or under bad rulers, its stronger neighbors swooped down upon it, and shared its lands amongst them. Frederick the Great of Prussia, Maria Theresa of Austria, and the Emperor of Russia, all helped in dividing Poland.

THE EMPERORS AND KINGS TRY TO BRING ORDER TO EUROPE

We have seen how Francis II. of Austria laid down the sceptre of Charlemagne and the crown of the thousand-year-old Roman Empire. This empire had kept together in a loose sort of way —more and more loose towards the end —these old states of Germany, and many more; and, after the Congress of Vienna, we see a confederation of German states, consisting of many smaller states, and two very large and powerful ones—the empire of Austria and the kingdom of Prussia. These were very jealous of each other's powers, and it was soon felt that the arrangement could not be a lasting one, especially as important changes in every direction, but chiefly in men's minds and thoughts, were seen to be hurrying on all over Europe.

It was the emperors, kings, and princes who settled matters at Vienna, and their idea was to restore things, as far as they could, to what they were before Napoleon's wars upset everything. But the people could no longer be forced to pay taxes they had had no voice in settling, to obey laws they had had no share in making, or to fight in wars arising out of their princes' quarrels.

THE GREAT LONGING OF THE PEOPLE FOR UNITY

The people wanted legislatures, with real representation of all classes; they wanted open courts of law and trial by juries; freedom of the Press, freedom in speech, and, above all, in religion. Slowly, through the years that followed the settlement of Europe at Vienna, the friends of freedom gained some of what they wanted. The revolutions in France during this time, of which we read on page 2289, especially the one in 1848, had a great influence in Germany; many of the rulers gave way on contested points for fear of being sent away, like Louis Philippe.

Another strong desire, besides the longing for liberty, was working in men's minds through all these years. It was

a growing wish for unity, the joining together of German-speaking states, so that they might show one undivided front to the rest of the world, especially in times of war and trouble. The very efforts that Napoleon had made to crush what small measure of unity the old Germany possessed had been the means of giving it fresh life, for what draws any family together closer than a common sorrow, or working together with a common object in view?

THE BLESSINGS OF PEACE, AND THE UNION OF THE GERMAN PEOPLES

But not only at the Battle of the Nations was there the sympathy of common effort, but the very hardness of the struggle for freedom in each separate state brought men, hitherto divided, nearer together. Then a great change in the customs, or taxes, hitherto set on all goods as they passed the frontiers of each state, was of immense help in opening out intercourse and good-fellowship as well as trade, for the barriers were done away with, and with them the expense of keeping up guarded frontiers. Most states joined Prussia in this customs union, but not Austria.

Then there were, besides all this, the blessings that came with peace. People were no longer afraid to build factories as hitherto, lest they should be burned or destroyed by an enemy's army, and trade grew as inventions and machinery of all kinds developed and were worked by steam. When the shining steel rails, laid down in state after state unceasingly, drew distant and out-of-the-way places closer together by making travel easy and quick, people could not only trade more, but could learn to know each other better, and so become less ignorant and narrow-minded.

BISMARCK, THE BOY WHO WAS BORN IN THE YEAR OF WATERLOO

In all the growth that was going on in these middle years of the nineteenth century, it was Prussia—the youngest of the kingdoms—that grew the fastest, and more and more took the lead in the German family of states.

Both times and men were ripening for the coming change. In the very year of the battle of Waterloo there was born a boy who grew up very clever, very determined, very far-seeing, through the years of change and growth in Germany. He made his way in 1847 into the legislature of the day, and learned much about other countries by being ambassador at Petrograd and Paris. Then his sovereign, William I., had need of him, and he became the king's chief Minister. This man was Bismarck, who saw plainly from the first how Prussia could rise to greatness, and set his face, like a flint, to make it great.

When the army had been reformed and strengthened, William I. and Bismarck were ready for the first step. Prussia went to war with Denmark about the two provinces of Holstein and Schleswig, between the Baltic and North Seas, which were claimed by both Denmark and Prussia. Austria joined Prussia in this war, and soon the two giants had their way over the smaller Power. Then, when Bismarck had settled the dispute that arose between the giants as to what should be done with the conquered provinces by taking possession of them for Prussia, he was ready for the second step.

THE GREAT MARCH THROUGH THE AVENUE OF LIMES IN BERLIN

This was war with Austria; the long-smoldering jealousy of the two rivals must now be settled by force of arms. The great General Moltke came to the front, and in seven weeks the war was finished by the final victory at Sadowa, in Bohemia, and the appearance near Vienna of the Prussians.

There is, in the city of Berlin, a wide street nearly a mile long, with an avenue of lime and chestnut trees. It is called "Unter den Linden," meaning "under the limes." At one end of the avenue is a magnificent gate, looking towards the old province of Brandenburg; at the other is the fine palace of William I.

Back under that Brandenburg Gate passed the victorious troops, the king welcoming them and leading them up the Unter den Linden, with Bismarck and Moltke, amid the girls scattering flowers, and the waving banners, and the music, and the enthusiastic crowds cheering and shouting "Hoch! Hoch!" to those who "in seven weeks had sped through Frederick's Seven Years," and had thus, almost at a blow, settled the leadership of the Prussian nation.

The peace that followed this war brought about great changes. New lands were added to Prussia; Austria lost some of hers. The old German

Confederation was done away with, and a new one formed of Prussia and the states north of the River Main, which runs into the Rhine at Mainz. A legislature, called the Reichstag, was formed of members from all the states that had joined the union, and in this Reichstag were to be discussed the questions affecting the states as a whole. Each state still kept control of its own affairs.

THE THIRD STEP IN THE SHAPING OF THE GERMAN EMPIRE

But Austria, so long the leader and head of the old Roman Empire, was shut out. Then, when the sharp rent between the two rival Powers was complete, the King of Prussia on one side of the mountains of Bohemia, the Emperor of Austria on the other, Bismarck was ready and waiting to take the third step in his plan for making Prussia great.

This was the chance of war with France. It came even sooner than he had dared to hope. We have already seen how Napoleon III. was disturbed at Germany's growing power, and how he wished to make his throne safe by dazzling the nation with military glory. An occasion for disagreement with Prussia soon rose. This happened to be that a Prussian prince was named as a king for Spain. Bismarck was ready and by a trick made the French feel that they had been insulted.

Upon this there followed one of the most surprisingly rapid and dramatic wars ever fought in Europe, the details of which many of our fathers and mothers read day by day in the papers, for it is only about half a century ago. Visitors staying in Germany at the time recall the story of the intense excitement just before the war broke out.

HOW THE FRENCH ARMY WAS DRIVEN INTO A TRAP AT SEDAN

Students in the university towns shouted themselves hoarse all night long with patriotic songs and loud hurrahs and "hochs!" Trains were crammed night and day with soldiers on their way to the front; and there was a constant stream of stores, food, and ambulances being made ready for despatch. Enthusiasm rose to a height when the South German States, who had not joined the new Confederation, threw in their lot with the Northern States led by the King of Prussia. Only Austria was shut out. France was greatly excited, too, and the soldiers set out for the Rhine, shouting valiantly: "To Berlin." But they were not ready for war. In the course of a fortnight the whole frontier was lined by German troops ready for action. And then—the pity of it!—in the beautiful, peaceful woods and passes of the Vosges Mountains, and the plains about the Rhine, the awful scenes of war brought misery to thousands of innocent people.

In the course of a month a large part of the French army was caught in a trap, and soon at Sedan Napoleon wrote to the King of Prussia: "As I have not died at the head of my troops, I hand over my sword to your Majesty." The whole French army surrendered: thousands of men, with officers, generals, marshals, cannon, and horses. An army of 135,000 men ceased to be.

Great was the rejoicing and excitement in "Unter den Linden" and before the king's palace when the telegrams reached Queen Augusta. She had to come to the balcony again and again to respond to the people's cheering.

THE BITTER NEWS THAT REACHED PARIS, AND THE FALL OF THE EMPEROR

When the bitter news reached Paris, Napoleon, a prisoner, was deposed, and a Republic proclaimed, and the new Government insisted on going on with the war. Within a fortnight of Sedan, the Germans were besieging Paris.

A second French army, even larger than the one defeated at Sedan, was now surrounded at Metz; but, in spite of this second disaster, the French gallantly tried to drive the Germans from Paris. Bismarck was now ready for his fourth and last step.

During this time the states of Germany, drawn together in fighting a common foe—their deadliest enemy in the past—took counsel together and decided that, the arms of Prussia being triumphant beyond all question, the moment had now arrived to put a seal on the unity of feeling that was growing stronger and stronger, by asking William I., the king of the victorious and leading state, to become the German Emperor, the head of the confederation of kings and princes.

How strange it seems that the brilliant scene, when William I. was hailed with wild delight as German Kaiser,

PROCLAMATION OF WILLIAM I, AS GERMAN EMPEROR, AT VERSAILLES

This is a picture of the proclamation of William I, German Emperor, during the Franco-Prussian War. In the first flush of victory, after the defeat of the French armies, it was proposed that all the German states, except Austria, should federate as an empire, of which the Prussian king should be emperor. The proposal was adopted, and the new emperor was enthusiastically proclaimed in the great hall at Versailles, on January 18, 1871. The man at the emperor's right—a little behind him—is Crown Prince Frederick, who afterwards reigned as emperor for a few months. The man below the dais, in a white uniform, is Prince Otto von Bismarck, the first chancellor of the new empire, who had been the directing force behind William while king of Prussia. He made the empire possible, and continued to serve the emperor faithfully.

should have taken place in the palace of Versailles, built by the greatest enemy of Germany, Louis XIV.

THE PRICE WHICH BISMARCK DEMANDED FROM FRANCE

The terms of peace which Bismarck forced the French to accept were very severe. The Treaty of Frankfort, which was signed May 10, 1871, said that France must give up all of Alsace, and much of Lorraine. She must pay the enormous sum of a billion dollars within three years, and must support a German army until the money was paid. As parts of the money were paid some of the soldiers were to be removed. The people rallied as one man to the support of the temporary government of France. No one had dreamed that there was so much money in the country. All, rich and poor, brought out their savings to lend to the government. The money was paid over to the Germans much sooner than any one had thought possible, and the German army marched out of France.

The German Empire was organized soon after the Emperor had been crowned. It was composed of four kingdoms, six grand-duchies, five duchies, seven principalities, three city republics, and the crown-land of Alsace-Lorraine, which was not allowed to govern itself. Austria was shut out. Prussia alone had about three-fifths of the territory and the population, and since the King of Prussia was always German Emperor, that state was always able to rule the Empire in most things.

HOW THE GERMAN EMPIRE WAS GOVERNED

The legislature of the Empire had two houses. The upper house, called the Bundesrat, was something like the United States Senate but had much more power. Except from the city republics the members were not elected but were appointed by the rulers of the states. They represented the kings, dukes or princes and not the people. The members from each state voted as they were instructed by their ruler. The Reichstag was something like the United States House of Representatives, but had much less power. The members were elected by the people, but more than half of them came from Prussia. While not half of the members of the Bundesrat came from Prussia nothing could be done without the consent of that state. In their own affairs each state made its own laws, if they did not interfere with the laws of the Empire.

The Chancellor was the actual head of the state. He was appointed by the Emperor and represented him and not the legislature. This is quite different from the plan in England or France, as you have learned. Otto von Bismarck, who had done so much to make Prussia strong, was Chancellor of the Empire from the beginning until 1890. He made the army still stronger, so that the Empire could not be attacked safely, and made a treaty with Austria and Italy, that they should defend one another, if attacked. He worked to strengthen the Emperor and the Empire. He encouraged manufacturing, and soon the Empire began not only to make most of the goods it needed but to sell much outside. For some kinds of goods, as dyes, chemicals and certain kinds of glassware, the German manufacturers supplied nearly the whole world. At first Bismarck did not believe that colonies strengthen a state, but changed his mind and the Empire seized a large part of Africa. Some islands of the Pacific also came under German control.

THE THREE RULERS OF THE GERMAN EMPIRE

William I was already seventy-four years old when he became Emperor, but he lived until 1888, seventeen years longer. He had been a strong ruler of Prussia, but during his last years he left the management of the affairs of the Empire very much to Bismarck, whom he trusted entirely. His people loved to see him as he rode about the streets, or in the parks, and mourned when he died.

He was succeeded by his son Frederick, who had won golden opinions by his skill as a soldier, and his love for books, art and music. He married the eldest child of Queen Victoria of England, and both took great interest in the education of women. Before his father died it was known that he had a serious throat trouble, and that an operation had been performed. It was not successful, and he came to the throne only to die. The sad event occurred June 15, 1888, after a reign of only ninety-nine days.

He was succeeded by his son William II, the third Emperor, then a young man of twenty-nine, who was the ruler of the Empire until his abdication.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 2761.

FISHES IN THEIR NATURAL COLORS

Some of these fishes have no English names, but these are the names by which they are known to all Natural History Students.

A. Locked Chevron
B. Spoon Beloneidae
C. Barbed Cowfish
D. Lyre Beauty
E. Dagger Fish
F. Coffer Fish
G. Red Sea Lapeer
H. Japanese Shrimpfish
I. Two-spotted Lizardfish
J. Parrotfish
K. Bearded Pipefish
L. Electric Ray
M. Many-striped Armfish
N. Mantaray
O. Zebra Shark
P. Scorpionfish Shrimpfish

As we see from this picture, fishes vary much in color, and some are quite bright and gaudy. They are not the same color all the year round, but like the birds, they put on their showiest and smartest dress in that season of the year when they are looking out for mates.

SMALLER FISHES OF THE SEA

CONTINUED FROM 2484

NOWHERE do we find the struggle for existence more keen than in the sea. Nearly all the fish are fish-eaters. Big fish eat lesser fish, and the smaller ones eat others still less in size. Life is one long battle for food, and food of fishes is for the most part living animals. After all, the conditions in this respect are not so greatly different from those on land. The carnivorous animals cannot eat anything but flesh; the birds of prey must have flesh for their support; the insect-eating birds must kill lesser living things for *their* support.

In a single mouthful a big hungry fish can swallow enough tiny fish to populate a whole sea. Therefore, if the various species of fish are not to die out, their families ought to be very numerous. And we find that that is so. It is really necessary that their numbers should be cut down, or the waters would not hold them all. We shall come to some startling figures in the insect families, but those of the fishes almost take away our breath.

Think what would happen if all the eggs of all the fishes hatched and all the little fish grew up! The common herring lays about 25,000 eggs; the lumpfish about 155,000; the big halibut lays about 3,500,000 eggs, which, considering the enormous number, are large eggs; the codfish lays over 9,000,000, while the ling lays about 150,000,000. One healthy ling would lay more eggs than there are people in the whole of our great continent. Now, unless there were severe checks, these numbers would speedily fill the seas, so that, though it is hard for those that suffer, it is necessary for the others that the numbers of fish should be reduced.

The people who like caviare will not thank the fishes which make their dinners of the eggs or young of the sturgeon. Caviare, which is a form of Russian food sought after mainly because it is so costly, is made from the roe of the sturgeon. The flesh of the fish is not of much account where its roe is chiefly desired. In England, however, people long ago made up their minds that the sturgeon is a luxury, and Edward II. greedily decided that any sturgeon caught in English rivers should be his. It is always called the royal fish in England, and even to-day, were one caught in the Thames, it would legally belong to the Crown, though of course the king would not allow it to be claimed from the man who caught it.

In America sturgeons are well-known and eaten, but no caviare is made. They go up rivers to lay their eggs. The river Volga is famous for its sturgeons, and it is from the

fisheries there that most of the caviare comes. The air-bladder of the sturgeon is made into isinglass. A piece of this bladder, if put into a hundred times its quantity of water, will turn the latter to a jelly. In structure the sturgeon is notable for the bony shields with which it is armed. It has a long snout, with which it roots in the mud and sand for worms and other food. Its mouth is underneath, and is equipped with finger-like feelers, with which it picks out its food.

Isinglass or gelatin is made from the air-bladder of the cod also. But that is of minor importance in regard to this fish. The cod is of great value as a food supply, while it yields an important medicine-food—cod-liver oil.

FISH THAT HAVE PROVIDED FOOD FOR A COLONY FOR 300 YEARS

Codfish are to be found where the herring shoals are, and swarm in enormous numbers off Norwegian coasts, in the North Sea, and to a still larger extent off Newfoundland. Codfish first established the importance of Newfoundland, Great Britain's oldest colony. There, for more than three centuries, fishing has been the chief occupation of the people. Thousands upon thousands of men depend for their living upon the cod-fishing, and almost as many women and children help in the curing of the fish.

Not nearly all the cod caught could be at once eaten; the greater number of them are salted and sent to various parts of the world to serve as food long afterwards. The average cod is from 2 feet to 4 feet in length, but some of them weigh 100 pounds.

It is to the banks of Newfoundland that most of the American fishermen go each year to get the vast supply which is needed for the people of the United States. These banks are ridges in the ocean where the water is only a few hundred feet deep, and where the cod assemble in great numbers in winter, feeding largely on the clams which swarm on the bottom, on squids, and small fish. This is the season of cold and storm, but hundreds of hardy men go from Gloucester, Marblehead, Portland, and other towns in New England, and in the Canadian provinces, in swift little vessels, and set their trawls, often when gales and snow make the sea tempestuous, and the air freezing cold. These trawls are long lines anchored at each end, and held up by buoys, to which are fastened every few yards other lesser lines, with baited hooks, which hang far down in the water. The cod seize the bait on some or all of these hanging hooks, and get caught. A few hours later a couple of men in a little row-boat, called a dory, go out and haul up the trawl, take off the cod that have been captured, rebait the hooks, and return to their ship. But often a fog or a snowstorm comes up to hide them from the captain's sight, and many a dory and its men are never picked up at all. These fishing-vessels are splendid sea-boats, and it is from them that our swiftest yachts have been perfected. Yet many are lost, and no occupation requires more courage and endurance than that of these fishermen.

The common Atlantic cod is probably the most important of the sea fishes in respect to North America; yet it is not the only one of this valuable family, for several of its relatives are caught for food, and eaten fresh or salted or dried. The big hake is one of these; another is the haddock. In Scotland the favorite breakfast fish is the whiting, a capital sort of codfish, which, unfortunately, does not live on the western side of the Atlantic. There are good codfish in the North Pacific, too.

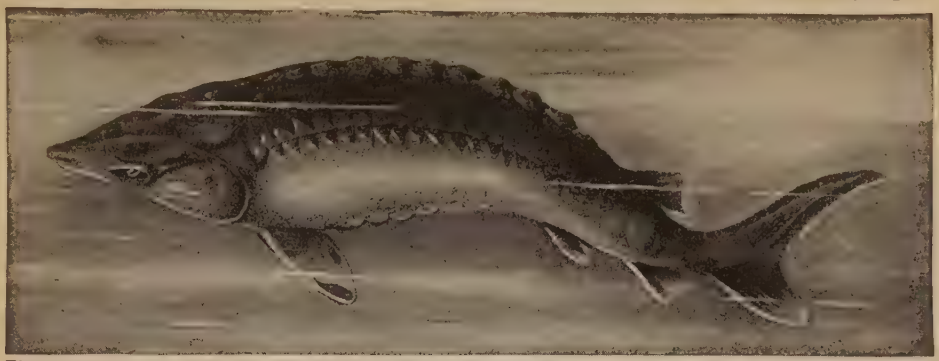
THE NET THAT CATCHES THE MACKEREL, ONE OF THE SWIFTEST FISH IN THE SEA

Our American fishermen catch mackerel and herring, too; but the most important, interesting fisheries for these fish are in Great Britain.

The mackerel is one of the fleetest swimmers in the sea. It is beautifully built for swimming, and has wonderful muscles, which give it both speed and strength. Countless moving swarms of mackerel are to be met. They lay their eggs on the surface of the water out at sea, but at certain times of the year they come into the shore.

The reason is that they follow the herrings, pilchards, and sprats, on which they feed. It is then that the fishermen net them. The nets are floated in the water, hanging straight down, like walls of thin cord. Owing to the color of the nets the mackerel cannot see them, but dash straight at them. Their heads enter the meshes, but the latter are too small for the thick part of the body to pass through, and the mackerel finds its

A ROYAL FISH IN GLISTENING ARMOR



The sturgeon is called the royal fish in Great Britain, because long ago a king said that all sturgeons caught in England should belong to the Crown. It is a handsome fish, covered with glistening scales of horny plates. In Russia, where it is abundant, the sturgeon is chiefly valued for its roe, which is made into caviare.

The hake belongs to the cod family, and eats herrings.

The haddock is a smaller member of the cod tribe.

The mackerel is one of the strongest and swiftest of fish, perfectly shaped for speed and endurance.

The whiting is a member of the cod family. It is plentiful round Plymouth, on the English coast.

The cod is one of the most important fish of the northern seas. Newfoundland depended for a long time upon the cod-fishing for its prosperity. The fish was so important to the people that they used to salt the flesh and give this in payment for other things, making it serve the purpose of money.

gills entangled in the netting. A million of these splendid fish were caught during a single week by the fishing boats of Newlyn, near Penzance.

A FISHERMAN'S HARVEST OF FIFTY MILES OF FISHES

The fishermen, on getting out of harbor, found what they called a sea of mackerel, measuring fifty miles round. These sound very big figures, but we must remember that the harvests of English and Welsh fishermen amount in a year to 500,000 tons of fish in some years, and the value of the fish taken to more than 30 million dollars. Those figures do not include the millions of all sorts of shell-fish caught. Neither can they include all the fish brought into the smaller ports. Thus we may see that the fish round the coasts are very important to the food supply and wealth of the country.

The herring is among the fish which yield the fishermen the greatest harvests. Its very name means multitude, for it comes from a German word signifying an army—an army of fish. It is a beautiful fish, with which we are all familiar, so there is no need to describe its appearance. But its habits repay study. In spite of the vast numbers caught, the herrings were themselves a great mystery to us for ages. Men believed that the fish congregated in their millions of millions in the cold waters of the frozen north, to which men could not go; then, at certain times of the year, obeyed the call of Nature to come to warmer latitudes, as if to offer themselves as food for men. We know now that the herrings do not come from the north.

THE GREAT ARMIES OF HERRINGS THAT COME AND GO IN THE SEA

They have their constant home in the waters off our own coasts, in the North Sea, in the Baltic, and elsewhere. It was believed that the great armies coming down from the north broke up into smaller contingents, calling at various parts of our coast, from the extreme north of Labrador down to Virginia. That, however, is not the case. They come in from sea in straight lines to the spots off the coasts where they wish to lay their eggs. Every year numbers of Scottish girls go from point to point of the coast, staying a week or so here, and a week or so there, to cure the herrings which are caught at each place in turn. They say that they are following the herrings from north to south. They are not; they are meeting the herrings as they come in from the sea. There are acres and acres of spawning-beds on our coasts to which the herrings go year after year. The eggs are laid in myriads among deep rocks, where they cannot be trawled up and destroyed by the nets of the fishermen. It is a good thing that the eggs are so numerous, and laid far from the reach of men, for the herrings have many enemies; such fish as haddocks eat enormous numbers of the herrings' eggs. But one of the wonderful things in Nature is that, where fish eggs are greatly sought as food by other fishes, the fish which lays them provides very large numbers. Where the eggs are few, the fish guards them; where they are many, the fish leaves them to their fate.

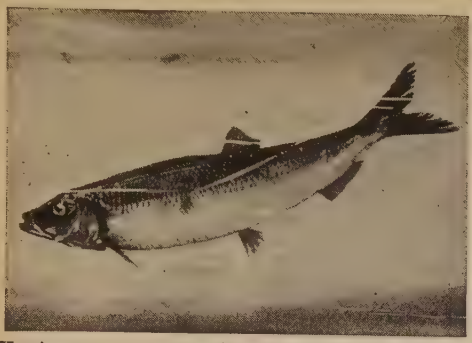
HOW THE HERRING HAS HELPED TO MAKE TOWNS RICH AND PROSPEROUS

The herring grows rapidly, but it does not attain full size until about two years old. When still quite small, it is caught and served up as whitebait. The flesh of the herring itself is excellent food, and someone has wisely said that if these fish cost a dollar each they would be prized as among the finest of fish.

Though they can be traced in the sea with such accuracy that the sailing of the fishing fleets may be directed by telegraph, the herrings do not always go to the same grounds. In the Baltic Sea, in which they used to swarm, there are not nearly so many as there were, and those remaining are smaller than the rest of the family. The Baltic is becoming less and less salt, and therefore the fish desert it or if they remain, do not attain to much size and strength.

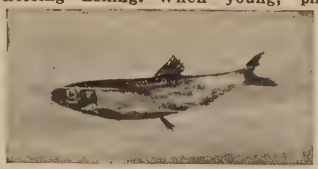
Many changes in the herring's travels have been noted in the course of history. Towns grew prosperous upon the harvest of herrings—Amsterdam, in its early stages, was built up very largely upon money made by the fishers of the herrings—and towns have declined when the herrings have changed their quarters. For ages the herrings used to teem at certain times of the year off the south coast of Sweden. Then they suddenly deserted it, and not a herring was seen there for seventy years. A few years ago

FISHES WITH EYES THAT CHANGE PLACES



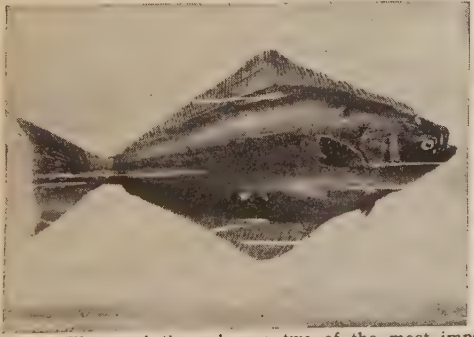
Herrings are among the most numerous fishes of the sea. Cities have depended entirely on the money they gained from herring fishing.

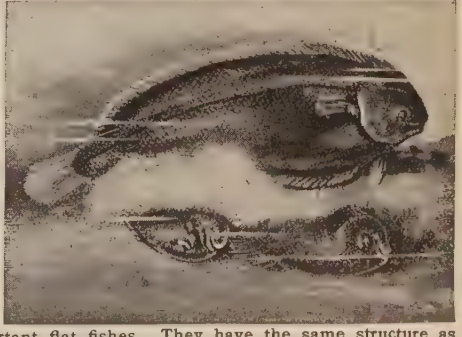
The pilchard is a relative of the herring, but thicker and shorter. As it grows up it loses its teeth. When young, pilchards are sold as sardines.



The sardine, the whitebait, and, on the right, the sprat, are all related. The sardine was first called the Sardinian fish, but nowadays young pilchards and little herrings and sprats are preserved in oil and called sardines. Whitebait are young herrings or young sprats. They are plentiful in the Thames, and in other days statesmen went to Greenwich for whitebait banquets as they go now to the Lord Mayor's feasts.

On the left the plaice, and on the right the turbot, represent the flat-fish family. They are formed like other fish when young, but as they grow older they undergo a strange alteration. The body is flattened, and the left eye travels round one side of the head, to be on top of the head like the right eye, so that the fish may see upwards with both eyes. Young flat fish live out at sea, old ones prefer shallow seas.





The halibut and the sole are two of the most important flat fishes. They have the same structure as the plaice and turbot. Their under side is really the left side, and the upper is the right side. When at rest they lie perfectly flat, with the left side underneath, and that side, receiving no light, has no color.

they returned, and the fishing industry has since then revived.

Sprats, shads, and sardines belong to the herring family. The sprat is so much like a small herring that only the trained eye of the expert would discover the differences which exist.

THE LITTLE MEMBERS OF THE HERRING FAMILY THAT HAVE MANY NAMES

They are treated as common food when sold as sprats, but when given the name of anchovy or whitebait, or served up in oil as sardines, sprats fetch a high price. The herrings come near land to lay their eggs; the sardines go out from the coast and lay theirs on the surface of the deep sea. So does the pilchard. This latter fish, off the English coast, reaches a length of 10 inches, and forms an important item of food, especially to those people in the Mediterranean countries, to whom it is sent salted in great barrels. Many fish that we call sardines, which come to us from France, are really young pilchards, which have been preserved in oil. Cornwall fishermen now can the young pilchard, and Kentish fishermen can the little sprat, and sell them as sardines — a name which meant, when first given, "the Sardinian fish."

Plaice, which is a famous European flounder, feed many other fish with *their* eggs. They lay their eggs out at sea. The tides carry the eggs towards the coast. As they travel, the eggs, if they escape other fish, develop, and the young fish hatch out as they reach the spot in which to make their homes.

THE WONDERFUL WAY IN WHICH THE FLAT FISHES BECOME FLAT

They now sink to the bottom of the sea, and undergo a most wonderful change. At first they are little ordinary-looking, thin fish, swimming in a vertical position, as other fish swim. At the end of the first year they are only from 2½ to 4 inches in length. In the next year they grow a couple of inches; but in the third year their size doubles, and they now become a foot long.

At four years of age they are from 14 to 20 inches long. But, in the meantime, they have wholly changed their appearance. Instead of swimming vertically they now swim flat; they have become broad and flat. The eyes, instead of being upon the two sides of the head, as in other fishes, have changed their relative positions, so that both eyes are now *on top* of the head. One eye has traveled round, so that the plaice can see upwards with both eyes.

This is one of the most striking evidences of the way in which changes come about in animal life. There is no doubt that the flat fish were, once upon a time, shaped like other fishes; but now when they grow up they have the left eye on top of the head, in a line with the right. This is not the only strange change. The upper part of the fish becomes colored like the sand or mud in which it makes its home, while underneath, where there is no light, it is white. Thus it can approach living prey without being detected. We know that if the flat fish were exposed to light on the under side they would become colored there too. An interested gentleman once tried the experiment.

He put some flounders, which, with the turbots and soles, belong to the same family as the plaice, into an aquarium. But the floor of the aquarium he made of a big mirror, so that the light which entered from above was reflected upward again by the mirror at the bottom. The experiment lasted some months, and at the end of that time some of the flounders had become colored underneath as they were on the back.

FISHES THAT LAY MILLIONS OF EGGS AND FISHES THAT SWIM HUNDREDS OF MILES

The sole is the most prized of the flat fish; the turbot comes next in cost; brill is another favorite; so is the halibut. This fish, which is caught in the North Atlantic for the American markets, has been known to grow to a length of 20 feet, and to weigh 500 pounds. The halibut of even moderate size lays about 1,300,000 eggs, though the biggest lay three times that number; the brill lays about 325,000, but the turbot lays 14,000,000. The flat fish swim by a gentle undulating motion of the body. A plaice was marked and turned loose in the sea. Three months afterwards the same plaice was caught after it had swum to a spot 173 miles away. Other marked plaice have swum at the rate of a mile an hour.

The size of the halibut reminds us that among the fishes which we consider the smaller ones of the ocean there are some really big ones. There is another big fellow in the tarpon, the giant of the herring family, which measures 6 or 7

feet, and weighs from 100 to 200 pounds. When caught on a hook it makes prodigious leaps in the air clear of the water. But it cannot, in this respect, match the flying-fish. This is a beautiful creature of the southern seas, about a foot in length, armed with a greatly extended tail and huge fins, which serve it almost as wings.

A FISH THAT USES ITS FINS FOR WINGS AND FLIES OUT OF THE SEA

These fins are compressed in the water. When the fish, either with a view of escaping from an enemy, or a desire to fly, determines to leave the water, the fins spread out like parachutes, and the fish at the same time inflates its air-bladder and air-sacs in its gills, and away into the air the flying-fish goes, higher than the masts of a ship. Some people say that this cannot be called flying, but Mr. Bullen, who has so often watched them, declares that the fish truly flies. The wings do not flutter like those of a bird, but vibrate like those of an insect. Just as the fish is about to enter the water the gaping jaws of a dolphin may await it, but the fish sees its danger, rises again into the air and flies away, just as it did before. These fish fly 1,000 yards, says Mr. Bullen, and they only cease flying when their fins become dry and stiff.

The flying-fish is much prized for food at sea by sailors; but the fish has other enemies in the air and water. There are the seagulls above, there are the dolphins and tunnies below. The tunny is another of the big smaller fish. It may be anything between 6 and 10 feet, and its weight up to half a ton. It swims with precision to the spot which it knows the flying-fish will touch on returning to the water, and if the fins be dry, down the tunny's throat goes the poor flying-fish.

A FISH THAT RIDES THROUGH THE OCEAN ON THE BACK OF A SHARK

The tunnies have some strange relatives called sucking-fishes. These latter have on their backs, extending back from the head, a wonderful sucking apparatus. Boys who have made leather suckers know how these work, and how strong a tug is necessary to pull up even a small one. Well, the sucking-fish's plates are still stronger, and once the fish has attached itself to an object it cannot be pulled off; it must be drawn sideways. Sharks are the fish to which sucking-fishes generally attach themselves, though sometimes they mistake a ship and fasten on to that, and go careering over the ocean, getting plenty of food on the way. Sometimes, too, they will cling to a turtle. Natives of Zanzibar and other places take advantage of this habit of the sucking-fish. They catch the fish, and, when they see a turtle in deep water, let down the sucking-fish on a line on to the turtle's back. The fish instantly grips the turtle and both are pulled up together, to the turtle's great surprise and indignation.

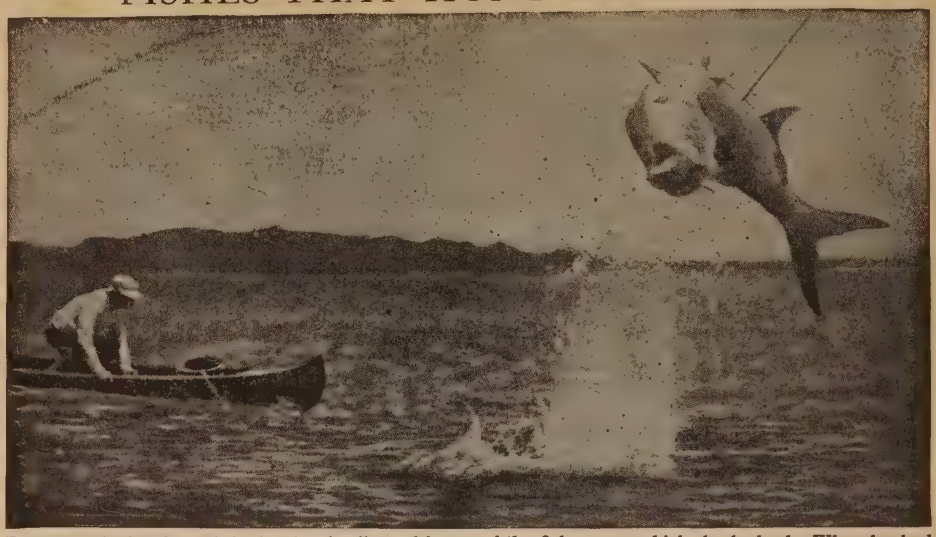
But this is not the only fish which bears the shark company. There is another, the pilot-fish, a famous little fellow. In olden times people believed that the pilot-fish used to guide and protect ships. He would swim before the ship when all was well, but would disappear, they said, if rocks or land were near, so as to warn the sailors of the danger of their running aground. It is a fact that the pilot-fish swims with ships and sharks, but it is not with any intent to guide or protect.

THE FISH THAT PILOTS THE SHARK TO FOOD AND SOMETIMES TO DEATH

When swimming with a shark, the pilot-fish keeps just ahead, and if he finds food, dashes about and flops his tail on top of the water to attract the shark's attention. Then, when the great fish comes up, he shares the meal with it. But often, when sailors throw a baited hook over the side of their ship, the pilot-fish will lead the shark to that and see it caught and hauled on board. The pilot-fish is about a foot in length, and striped with bars of a darker color upon a ground of blue.

If we consider the pilot-fish the shark's huntsman, we come next to a huntsman of a very different sort, the huntsman who shows, perhaps, more skill than any other fish in obtaining his food. This is the angling-fish, or fishing-frog, or sea-devil, whichever we choose to call it. It is an ugly creature, with a frightful mouth armed with rasplike teeth, and, as it attains a length in some waters of 5 feet, it is naturally a terror to smaller fish. But, as it moves very slowly, it has to resort to trickery. It walks along the bottom of the sea on its two broad fins. With these it stirs up the sand and mud so as to hide itself while it

FISHES THAT HUNT IN THE SEA



The tarpon is the giant of the herring family, and is one of the fishes upon which sharks feed. When hooked by fishermen the tarpon tries to escape by leaping into the air. Sometimes the shark seizes it as it descends.

The lump-sucker, though a good swimmer, likes steady rest, and sticks to rocks by its sucking disc.

Pilot-fishes swim near ships and sharks, and often lead the latter to death by finding a baited hook.

The angler-fish is one of the ugliest, but one of the most skilful fishes. The angler-fishes of long ago were good swimmers, but modern ones lead a slothful life down at the bottom of the sea. Prevented by its habits from catching prey by speed, the angler depends upon trickery. It buries itself in the mud, but leaves sticking up a curious tentacle, which attracts other fishes, and they are then seized by the angler's terrible jaws.

PIPE-FISH, POISON FISH, & THE SEA-HORSE

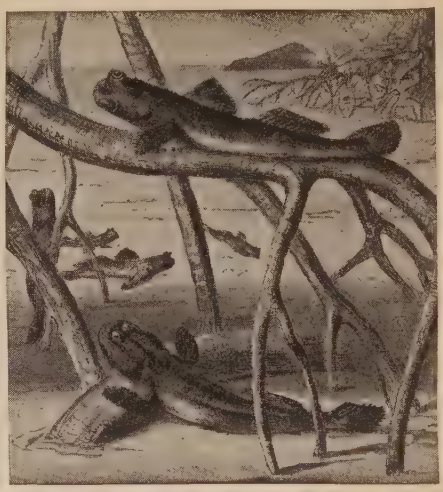
Here we have two poisonous fish. The first is the parrot-wrasse, to eat which would make us ill. The second, the sting-bull, discharges its poison into wounds made by its prickles. The fish itself forms good food.

We can see at once from its curious mouth why the larger of these fishes is called the great pipe-fish. The smaller is the famous little sea-horse. The male carries its children in a little pouch, like the kangaroos.

Two of the strangest creatures of the sea are the globe-fish, which we see on the left, and the coffer-fish. Both are poisonous as food, because they eat food from the corals, which is poisonous to us, though wholesome to them. The globe-fish inflates itself like a balloon, and, guarded by its prickles, is safe from enemies.

arouses the curiosity of other fish and draws them near. This plan does not always succeed, and as an alternative the angler lies buried with a fishing-rod in action. The fishing-rod is a long tentacle sticking up from the head, with a sort of fringe at the end. This the angler is able to agitate, and fish, thinking it is something good to eat, approach to seize it, to be themselves engulfed in the fearful mouth of the sea-devil.

The angler-fish gets along well enough on his fins under water, but there are smaller fish, called the mud-skippers, which do the same with theirs on land. They leave the sea or the rivers up which they have made their way, skip about on the mud, snap up flies or insects, climb trees, and, when resting, raise themselves on their fins as we do on our elbows, and watch the world around them with the most comical look.



We do not expect to see fishes climb trees, but the curious mud-skippers we see here do. They come ashore and lie snapping at flies.

All sorts and sizes of mouths and teeth are distributed among the fishes, and we now come to some which are called pipe-fish, because of the pipe-like shape of their mouths. One very famous member of this family is the hippocampus, or sea-horse. It gets its name from the fact that with its bright, prominent eyes, the shape of its mouth, and two little fins on the top of the head which look like the cocked ears of a horse, it presents much the appearance of that animal's head. The sea-horse is like some of the monkeys and other animals—its tail is a sort of hand to it. When it wishes to rest, it coils its tail round a piece of seaweed, and holds on to it by its tail, floating in the water, catching what food chances to come that way.

A FISH THAT CARRIES ITS YOUNG IN A POUCH, LIKE THE KANGAROO

Another interesting feature about this pretty pipe-fish is its resemblance to the kangaroo. The male collects the eggs which the female lays, and stores them in a little leathery pouch which he has under his body. There the eggs hatch, and when the little fish are born this pouch is their cradle, and a refuge to which they always repair in time of danger. Most of us who have read as far as this have agreed that there are many sorts of fish which we should not care to eat.

THE POISONOUS FISH AND THE STINGING FISH THAT SWIMS IN MANY WATERS

Some of the fish are poisonous at all times, others are poisonous at certain periods of the year. Some of the latter are to be found among the strange and often beautiful fish which haunt the coral beds. The food that they eat contains poison, and its power is exercized upon people who eat the fish. Among those always poisonous are the parrot-wrasses, West Indian herrings, and certain kinds of file-fish, coffer-fish, and globe-fish. The last three are very curious fish. The coffer-fish is enclosed in a framework like a box; the file-fishes have teeth like files; the globe-fishes are the hedgehogs of the sea, prickly things, as bad to handle as a ball of spikes. Some of them can inflate themselves with air, like a balloon, and then they float at their ease, safe from attack because of their deadly spines. There is a fish in English waters, the sting-bull, which carries a nasty poison, but makes excellent food. Measuring from a foot to seventeen inches, it is armed with sharp prickles along its back. If the hand of a man be pricked by one of these, the poison enters the wound, and in a few minutes he feels the pain right up to the shoulder. Three men, one after another, have been stung by one fish.

There are thousands and thousands of other fish in the sea, beautiful and ugly, good for food and poisonous; but we cannot follow them further. We must now have a look at those other interesting creatures, the animals which live in shells.

THE NEXT NATURE STORY BEGINS ON PAGE 2611.